Analog Voltage/Pulse Train Reference Type SERVOPACKs

SGDV-□□□□01

(For Rotary Servomotors)

SGDV-□□□□05

(For Linear Servomotors)

Model Designations

S G D V- R70 A 01 A 000 00 0

Σ-V Series SGDV SERVOPACK	1st+2nd+3rd digits	4th digit	5th+6th digits	7th digit	8th+9th+10th digits	11th+12th digits	13th digit

1st+2nd+3rd digits Current

Voltage	Code	Applicable Servomotor Max. Capacity kW
Three-phase 200 V	R70*1	0.05
	R90*1	0.1
	1R6*1	0.2
	2R8*1	0.4
	3R8	0.5
	5R5*1	0.75
	7R6	1.0
	120*2	1.5
	180	2.0
	200	3.0
	330	5.0
	470	6.0
	550	7.5
	590	11
	780	15
Three-phase 400 V	1R9	0.5
	3R5	1.0
	5R4	1.5
	8R4	2.0
	120	3.0
	170	5.0
	210	6.0
	260	7.5
	280	11
	370	15

4th digit Power Supply Voltage

Code	Specifications
A	Three-phase 200 VAC
D	Three-phase 400 VAC

5th+6th digits Interface

Code	Specifications
01	Analog voltage/pulse train reference type (for rotary servomotors)
05	Analog voltage/pulse train reference type (for linear servomotors)

7th digit Design Revision Order

A, B...

8th+9th+10th digits Options (hardware)

Code	Specifications
000	Base-mounted (standard)
001	Rack-mounted*3
002	Varnished
003	Rack-mounted*3 and Varnished
008	Single-phase 200 VAC input (Model: SGDV-120A01A008000)
020	Dynamic brake (400 V SERVOPACKs only)

11th+12th digits Options (software)

Code	Specifications
00	Standard

13th digit Options (parameter)

Code	Specifications
0	Standard

*1: These amplifiers can be powered with single or three-phase.
*2: Single-phase 200 VAC SERVOPACKs are also available. (Model: SGDV-120A01A008000)
*3: SERVOPACKs of 6 kW or more are duct-ventilated.
Note: If the option codes digits 8 to 13 are all zeros, they are omitted.

Features

- Unprecedented ease-of-use through cutting-edge technology
  New tuning-less function means no adjustment needed.
  Impressive load regulation with strengthened vibration suppression function.
- Slashed setup time
  Setup wizard function and wiring conformation function of engineering tool SigmaWin+ allows easy setup just by watching the monitor.
- High response characteristics at 1 kHz min.
  New advanced autotuning.
  Reduced positioning time through model following control, and smooth machine control enabled by vibration suppression function.

Ratings

Single-phase 200 V

SERVOPACK Model SGDV-□□□□		R70A	R90A	1R6A	2R8A	5R5A	120A*
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4	0.75	1.5
Continuous Output Current	Arms	0.66	0.91	1.6	2.8	5.5	11.6
Max. Output Current	Arms	2.1	2.9	5.8	9.3	16.9	28
Regenerative Resistors		None or external				Built-in or external	
Main Circuit*		Single-phase 200 to 230 VAC+10% to -15% 50/60 Hz					
Control Circuit*		Single-phase 200 to 230 VAC+10% to -15% 50/60 Hz					

*: The rated voltage is 220 to 230 VAC for the SGDV-120A01A008000 SERVOPACK.

Three-phase 200 V

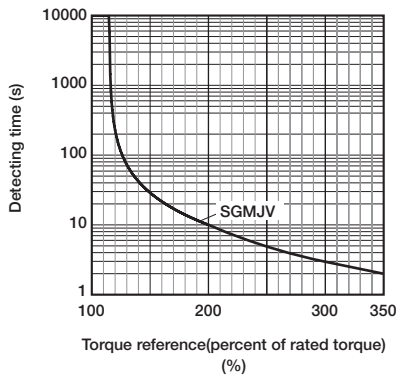
SERVOPACK Model SGDV-□□□□		R70A	R90A	1R6A	2R8A	3R8A	5R5A	7R6A	120A	180A	200A	330A	470A	550A	590A	780A
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4	0.5	0.75	1.0	1.5	2.0	3.0	5.0	6	7.5	11	15
Continuous Output Current	Arms	0.66	0.91	1.6	2.8	3.8	5.5	7.6	11.6	18.5	19.6	32.9	46.9	54.7	58.6	78
Max. Output Current	Arms	2.1	2.9	5.8	9.3	11	16.9	17	28	42	56	84	110	130	140	170
Regenerative Resistors		None or external				Built-in or external							External			
Main Circuit		Three-phase 200 to 230 VAC+10% to -15% 50/60 Hz														
Control Circuit		Single-phase 200 to 230 VAC+10% to -15% 50/60 Hz														

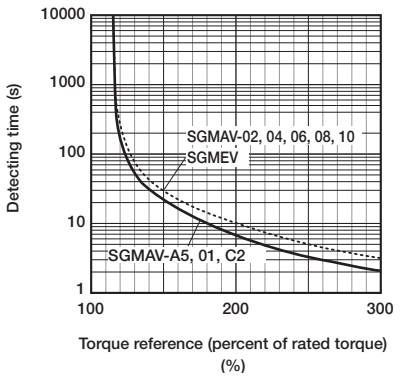
Three-phase 400 V

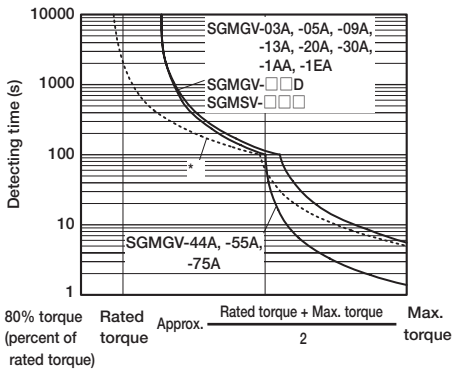
SERVOPACK Model SGDV-□□□□		1R9D	3R5D	5R4D	8R4D	120D	170D	210D	260D	280D	370D
Applicable Servomotor Max. Capacity	kW	0.5	1.0	1.5	2.0	3.0	5.0	6	7.5	11	15
Continuous Output Current	Arms	1.9	3.5	5.4	8.4	11.9	16.5	20.8	25.7	28.1	37.2
Max. Output Current	Arms	5.5	8.5	14	20	28	42	55	65	70	85
Regenerative Resistors		Built-in or external						External			
Main Circuit		Three-phase 380 to 480 VAC+10% to -15% 50/60 Hz									
Control Circuit		24 VDC ±15%									

Note: The entire over voltage category is Ⅲ.

● SERVOPACK Overload Characteristics







Note: Overload characteristics shown above do not guarantee continuous duty of 100% or more output. Use a servomotor with effective torque within the continuous duty zone of Torque-Motor Speed Characteristics.

*: The dotted line indicates the characteristics of a combination of SGDV-200A SERVOPACKs and SGMGV-30A servomotors.

Specifications

Items			Specifications	
Control Method			IGBT PWM control, sine-wave driven	
Feedback	Rotary Servomotors		Serial encoder: 13-bit (incremental encoder) : 17-bit (incremental/absolute encoder) : 20-bit (incremental/absolute encoder)	
	With Linear Servomotors		Absolute linear scale (The signal resolution varies depending on the absolute linear scale.) Incremental linear scale (The signal resolution varies depending on the incremental linear scale or serial converter unit.)	
Operating Conditions	Ambient Temperature		0 to +55°C	
	Storage Temperature		–20 to +85°C	
	Ambient Humidity		90%RH or less	With no freezing or condensation
	Storage Humidity		90%RH or less	
	Vibration Resistance		4.9 m/s²	
	Shock Resistance		19.6 m/s²	
	Protection Class		IP10	An environment that satisfies the following conditions. • Free of corrosive or flammable gases • Free of exposure to water, oil, or chemicals • Free of dust, salts, or iron dust
	Pollution Degree		2	
	Altitude		1000 m or less	
	Others		Do not use SERVOPACKs in the following locations: • Locations subject to static electricity noise, strong electromagnetic/magnetic fields, radioactivity	
Applicable Standards			UL508C EN50178, EN55011/A2 group1 classA, EN61000-6-2, EN61800-3, EN61800-5-1, EN954-1, IEC61508-1 to 4	
Mounting			Standard: Base-mounted Optional: Rack-mounted, Duct-ventilated	
Performance	Speed Control Range		1:5000 (The lower limit of the speed control range must be lower than the point at which the rated torque does not cause the servomotor to stop.)	
	Speed Regulation*1	Load Fluctuation	0% to 100% load: ±0.01% max. (at rated speed)	
		Voltage Fluctuation	Rated voltage: ±10% : 0% (at rated speed)	
		Temperature Fluctuation	25±25°C : ±0.1% max. (at rated speed)	
	Torque Control Tolerance (Repeatability)		±1%	
	Soft Start Time Setting		0 to 10 s (can be set individually for acceleration and deceleration.)	
Communications	RS-422A Communications	Interface	Digital operator (JUSP-OP05A-1-E), personal computer (can be connected with SigmaWin+)	
		1:N communications	RS-422A port: N=15 max. available	
		Axis address setting	Set by parameters	
	USB Communications	Interface	Personal computer (can be connected with SigmaWin+.)	
		Communications Standard	Compliant with USB1.1 standard (12 Mbps)	
Display			CHARGE indicator	
Analog Monitor			Number of points: 2 Output voltage: ±10 VDC (linearity effective range ±8 V) Resolution: 16 bit Accuracy: ±20 mV (Typ) Max. output current: ±10 mA Settling time (±1%): 1.2 ms (Typ)	
Dynamic Brake (DB)			Activated when a servo alarm or overtravelling (OT) occurs, or when the power supply for the main circuit or servomotor is OFF.	
Regenerative Processing			Included (For more information, refer to the previous page.)	
Overtravelling (OT) Prevention			Dynamic brake stop at P-OT or N-OT, deceleration to a stop, or free run to a stop	
Protective Functions			Overcurrent, Overvoltage, low voltage, overload, regeneration error , etc.	
Utility Functions			Gain adjustment, alarm history, JOG operation, origin search, etc.	
Safety Functions		Input	/HWBB1, /HWBB2: Baseblock signal for power module	
		Output	EDM1: Status monitor (fixed output) of built-in safety circuit	
		Applicable Standards*2	EN954 category 3 IEC61508 SIL2	
Option Module			Fully-closed Module	

*1: Speed regulation is defined as follows:

$$\text{Speed regulation} = \frac{\text{No-load motor speed} - \text{Total load motor speed}}{\text{Rated motor speed}} \times 100\%$$

The motor speed may change due to voltage fluctuation or temperature fluctuation.
The ratio of speed changes to the rated speed represent speed regulation due to voltage and temperature fluctuations.

*2: Perform risk assessment for the system and confirm that the safety requirements for the standards are fulfilled before using the HWBB function.

Specifications

● Rotary Servomotors

Items				Specifications	
I/O Signal	Encoder Output Pulses			Phase A, phase B, phase C: line driver output The number of dividing pulse: Any setting ratio is available.	
	Sequence Input		Fixed Input	SEN signal	
			Input Signals which can be allocated	Number of Channels	7 channels
				Functions	• Servo ON (/S-ON) • Internal set speed selection (/SPD-D, /SPD-A, /SPD-B) • Proportional control (/P-CON) • Forward run prohibited (P-OT), reverse run prohibited (N-OT) • Control selection (/C-SEL) • Zero clamping (/ZCLAMP) • Alarm reset (/ALM-RST) • Reference pulse inhibit (/INHIBIT) • Forward external torque limit (/P-CL), reverse external torque limit (/N-CL) • Gain selection (/G-SEL) Positive and negative logic can be changed.
	Sequence Output		Fixed Output	Servo alarm (ALM), alarm code (ALO1, ALO2, ALO3) outputs	
			Output Signals which can be allocated	Number of Channels	3 channels
				Functions	• Positioning completion (/COIN) • Speed limit detection (/VLT) • Speed coincidence detection (/V-CMP) • Brake (/BK) • Rotation detection (/TGON) • Warning (/WARN) • Servo ready (/S-RDY) • Near (/NEAR) • Torque limit detection (/CLT) Positive and negative logic can be changed.
Panel Operator			Display Unit	Five 7-segment LEDs	
			Switch	Four push switches	
Torque Control	Input Signals		Reference Voltage	• Max. input voltage: ±12 V (forward torque reference with positive reference) • Factory setting: 3 VDC at rated torque (Input gain setting can be changed.)	
			Input Impedance	About 14 kΩ	
			Circuit Time Constant	16 μs	
Speed Control	Soft Start Time Setting			0 to 10 s (can be set individually for acceleration and deceleration.)	
	Input Signals		Reference Voltage	• Max. input voltage: ±12 V (forward speed reference with positive reference) • Factory setting: 6 VDC at rated speed (Input gain setting can be changed.)	
			Input Impedance	About 14 kΩ	
			Circuit Time Constant	30 μs	
	Internal Set Speed Control		Rotation Direction Selection	With P control signal	
			Speed Selection	With forward/reverse external torque limit signal (speed 1 to 3 selection). Servomotor stops or another control method is used when both are OFF.	
Position Control	Feedforward Compensation			0 to 100%	
	Positioning Completed Width Setting			0 to 1073741824 reference units	
	Input Signals	Reference Pulse	Type	Select one of them: Sign + pulse train, CW + CCW pulse train, or two-phase pulse train with 90°phase differential	
			Form	For line driver, open collector	
			Max. Input Pulse Frequency*	Line driver Sign + pulse train, CW + CCW pulse train: 4 Mpps Two-phase pulse train with 90°phase differential:1 Mpps Open Collector Sign + pulse train, CW + CCW pulse train: 200 kpps Two-phase pulse train with 90°phase differential: 200 kpps	
		Clear Signal		Position error clear For line driver, open collector	

*: If the maximum reference frequency exceeds 1 Mpps, use a shielded cable for I/O signals and ground both ends of the shield.
Connect the shield at the SERVOPACK to the connector shell.

Specifications

● Linear Servomotors

Items				Specifications
I/O Signal	Encoder Output Pulses			Phase A, phase B, phase C: line driver output The number of dividing pulse: Any setting ratio is available.
	Sequence Input	Fixed Input		SEN signal
		Input Signals which can be allocated	Number of Channels	7 channels
			Functions	• Servo ON (/S-ON) • Internal set speed selection (/SPD-D, /SPD-A, /SPD-B) • Proportional control (/P-CON) • Forward run prohibited (P-OT), Reverse run prohibited (N-OT) • Control selection (/C-SEL) • Zero clamping (/ZCLAMP) • Alarm reset (/ALM-RST) • Reference pulse inhibit (/INHIBIT) • Forward external force limit (/P-CL), Reverse external force limit (/N-CL) • Gain selection (/G-SEL) • Polarity detection (P-DET) Positive and negative logic can be changed.
	Sequence Output	Fixed Output		Servo alarm (ALM), alarm code (ALO1, ALO2, ALO3) outputs
		Output Signals which can be allocated	Number of Channels	3 channels
			Functions	• Positioning completion (/COIN) • Speed limit detection (/VLT) • Speed coincidence detection (/V-CMP) • Brake (/BK) • Servomotor movement detection (/TGON) • Warning (/WARN) • Servo ready (/S-RDY) • Near (/NEAR) • Force limit detection (/CLT) Positive and negative logic can be changed.
Panel Operator		Display Unit		Five 7-segment LEDs
		Switch		Four push switches
Force Control	Input Signals	Reference Voltage		• Max. input voltage: ±12 V (forward force reference with positive reference) • Factory setting: 3 VDC at rated force (Input gain setting can be changed.)
		Input Impedance		About 14 kΩ
		Circuit Time Constant		16 μs
Speed Control	Soft Start Time Setting			0 to 10 s (can be set individually for acceleration and deceleration.)
	Input Signals	Reference Voltage		• Max. input voltage: ±12 V (forward speed reference with positive reference) • Factory setting: 6 VDC at rated speed (Input gain setting can be changed.)
		Input Impedance		About 14 kΩ
		Circuit Time Constant		30 μs
	Internal Set Speed Control	Movement Direction Selection		With P control signal
		Speed Selection		With forward/reverse external force limit signal (speed 1 to 3 selection). Servomotor stops or another control method is used when both are OFF.
Position Control	Feedforward Compensation			0 to 100%
	Positioning Completed Width Setting			0 to 1073741824 reference units
	Input Signals	Reference Pulse	Type	Select one of them: Sign + pulse train, forward + reverse pulse train, two-phase pulse train with 90°phase differential
			Form	For line driver, open collector
			Max. Input Pulse Frequency*	Line driver Sign + pulse train, forward + reverse pulse train: 4 Mpps Two-phase pulse train with 90°phase differential:1 Mpps Open Collector Sign + pulse train, forward + reverse pulse train: 200 kpps Two-phase pulse train with 90°phase differential: 200 kpps
		Clear Signal		Position error clear For line driver, open collector

*: If the maximum reference frequency exceeds 1 Mpps, use a shielded cable for I/O signals and ground both ends of the shield.
Connect the shield at the SERVOPACK to the connector shell.

Power Supply Capacities and Power Losses

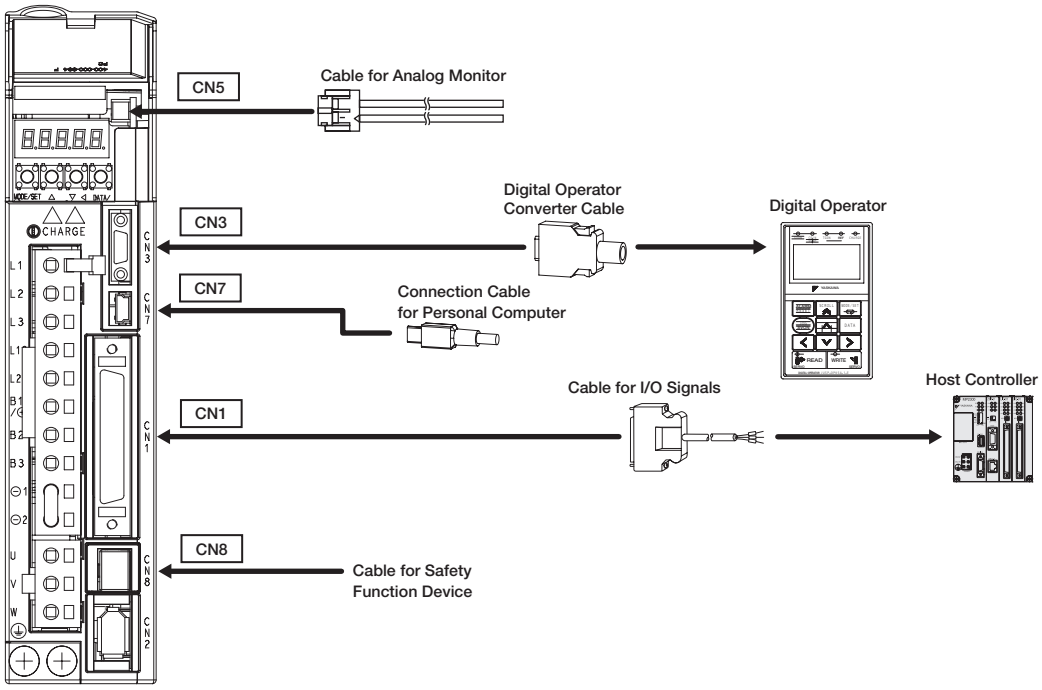
The following table shows SERVOPACK's power supply capacities and power losses at the rated output.

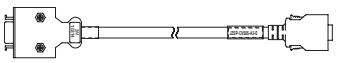
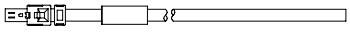
Main Circuit Power Supply	Applicable Servomotor Max. Capacity kW	SERVOPACK Model SGDV-	Power Supply Capacity kVA	Output Current Arms	Main Circuit Power Loss W	Regenerative Resistor Power Loss W	Control Circuit Power Loss W	Total Power Loss W
Single-phase 200 V	0.05	R70A	0.2	0.66	5.2	—	17	22.2
	0.1	R90A	0.3	0.91	7.4			24.4
	0.2	1R6A	0.7	1.6	13.7			30.7
	0.4	2R8A	1.2	2.8	24.9			41.9
	0.75	5R5A	1.9	5.5	52.7	8		77.7
	1.5	120A	4	11.6	68.2	10	22	100.2
Three-phase 200 V	0.05	R70A	0.2	0.66	5.1	—	17	22.1
	0.1	R90A	0.3	0.91	7.3			24.3
	0.2	1R6A	0.6	1.6	13.5			30.5
	0.4	2R8A	1	2.8	24.0			41.0
	0.5	3R8A	1.4	3.8	20.1	8		45.1
	0.75	5R5A	1.6	5.5	43.8			68.8
	1.0	7R6A	2.3	7.6	53.6			78.6
	1.5	120A	3.2	11.6	65.8	10	22	97.8
	2.0	180A	4	18.5	111.9	16		149.9
	3.0	200A	5.9	19.6	113.8			161.4
	5.0	330A	7.5	32.9	263.7	36	27	326.7
	6.0	470A	10.7	46.9	279.4	(180)*1	33	312.4
	7.5	550A	14.6	54.7	357.8	(350)*2		390.8
	11	590A	21.7	58.6	431.7		48	479.7
	15	780A	29.6	78	599.0			647.0
Three-phase 400 V	0.5	1R9D	1.1	1.9	24.6	14	21	59.6
	1.0	3R5D	2.3	3.5	46.1			81.1
	1.5	5R4D	3.5	5.4	71.3			106.3
	2.0	8R4D	4.5	8.4	77.9	28	25	130.9
	3.0	120D	7.1	11.9	108.7			161.7
	5.0	170D	11.7	16.5	161.1	36	24	221.1
	6.0	210D	12.4	20.8	172.7	(180)*3	27	199.7
	7.5	260D	14.4	25.7	218.6			245.6
	11	280D	21.9	28.1	294.6	(350)*4	30	324.6
	15	370D	30.6	37.2	403.8			433.8

*1: For the optional JUSP-RA04-E regenerative resistor unit.
*2: For the optional JUSP-RA05-E regenerative resistor unit.
*3: For the optional JUSP-RA18-E regenerative resistor unit
*4: For the optional JUSP-RA19-E regenerative resistor unit.
Notes: 1 SGDV-R70A, -R90A, -1R6A, and -2R8A SERVOPACKs do not have built-in regenerative resistors.
If the regenerative energy exceeds the specified value, connect an external regenerative resistor (optional).
2 SGDV-470A, -550A, -590A, -780A, -210D, -260D, -280D, -370D SERVOPACKs do not have built-in regenerative resistors.
Be sure to connect a regenerative resistor unit (optional) or an external regenerative resistor (optional). For selection details, refer to page 364.
3 Regenerative resistor power losses are allowable losses. Take the following action if this value is exceeded.
• Remove the lead or short bar that is short-circuiting the SERVOPACK main circuit terminal B2 and B3.
(SGDV-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, -330A, or 400-V class SERVOPACKs.)
• Install an external regenerative resistor (optional). For selection details, refer to page 364.

Selecting Cables

● Cables for CN1 CN3 CN5 CN7 CN8 (Analog Voltage/Pulse Train Reference Type SERVOPACKs)



Name		Length	Order No.	Specifications	Details
CN1 Cables for I/O Signals	Connector Kit		JZSP-CSI9-1-E	Soldered 	(1)
	Connector Terminal Converter Unit	0.5 m	JUSP-TA50PG-E	Terminal Block and Connection Cable 	(2)
		1 m	JUSP-TA50PG-1-E		
		2 m	JUSP-TA50PG-2-E		
	Cables with Loose Wires at One End	1 m	JZSP-CSI01-1-E	Cable with Loose Wires at Peripheral Devices 	(3)
		2 m	JZSP-CSI01-2-E		
		3 m	JZSP-CSI01-3-E		
CN3	Digital Operator		JUSP-OP05A-1-E	With Connection Cable (1 m) 	(4)
	Digital Operator Converter Cable*1	0.3 m	JZSP-CVS05-A3-E	Cable with Connectors at Both Ends 	(5)
CN7 Connection Cables for Personal Computer		2.5 m	JZSP-CVS06-02-E	Cable with Connectors at Both Ends 	(6)
CN5 Cables for Analog Monitor		1 m	JZSP-CA01-E	SERVOPACK End 	(7)
CN8 Cable for Safety Function Device	Cables with Connector*2	3 m	JZSP-CVH03-03-E JZSP-CVH03-03-E-G3		(8)
	Connector Kit*3		Contact Tyco Electronics AMP K.K. Product name: Industrial Mini I/O D-shape Type1 Plug Connector Kit Model: 2013595-1		

*1 : A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-Ⅴ series SERVOPACKs.
*2 : When using the safety function, connect this cable to the safety devices.
Even when not using the safety function, use SERVOPACKs with the Safe Jumper Connector (model: JZSP-CVH05-E) connected.
*3 : Use the connector kit when you make cables yourself.

Selecting Cables

(1) Connector Kit for CN1

Use the following connector and cable to assemble the cable. The CN1 connector kit includes one case and one connector.

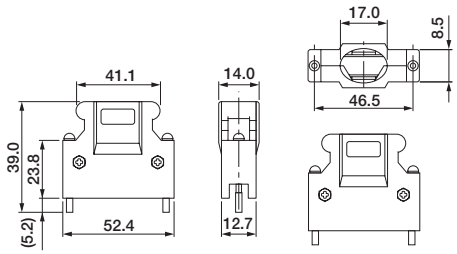
Connector Kit Model	Case		Connector	
	Model	Qty	Model	Qty
JZSP-CSI9-1-E	10350-52Z0-008*	1 set	10150-3000PE* (Soldered)	1

* : Manufactured by Sumitomo 3M Ltd.

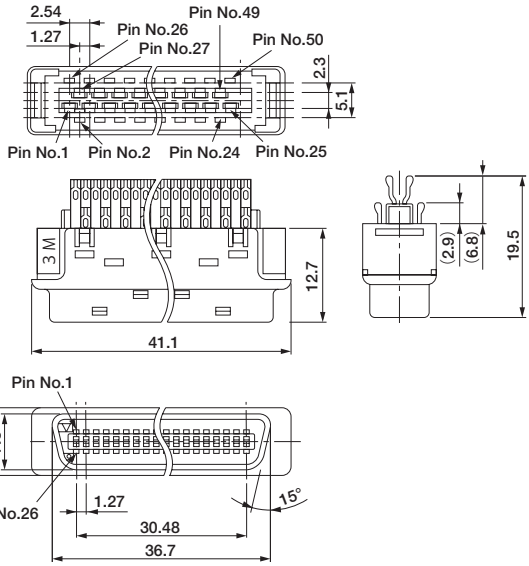
• Cable Size

Item	Specifications
Cable	Use twisted-pair or twisted-pair shielded wire.
Applicable Wires	AWG24, 26, 28, 30
Cable Finished Diameter	16 dia. max.

• External Dimensions of Case (Units: mm)

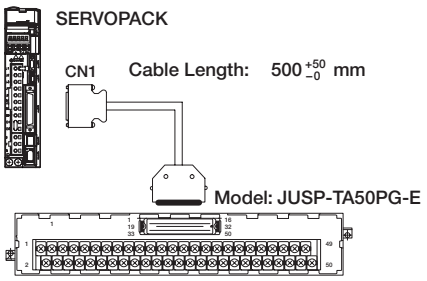


• External Dimensions of Connector (Units: mm)

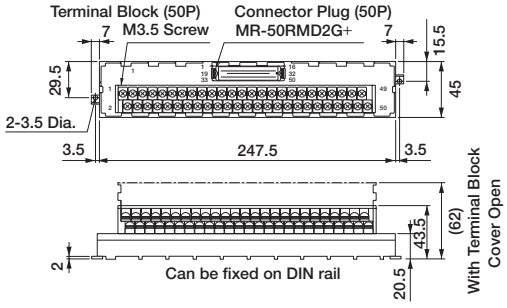


(2) Connector Terminal Converter Unit for CN1

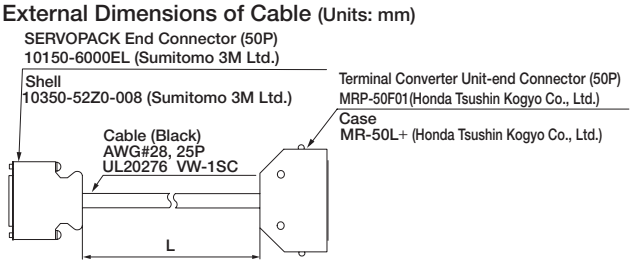
• Configurations



• External Dimensions of Terminal Block (Units: mm)



• External Dimensions of Cable (Units: mm)



Model	Cable Length (L)
JUSP-TA50PG-E	0.5 m
JUSP-TA50PG-1-E	1 m
JUSP-TA50PG-2-E	2 m

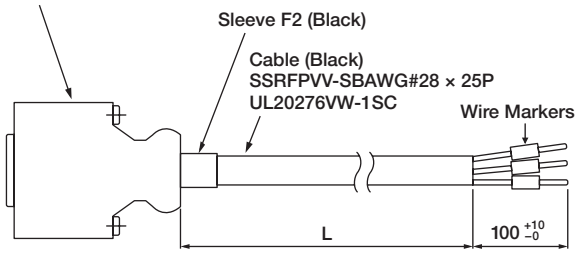
Note: The pin numbers in the SERVOPACK connector and the pin numbers in the terminal block are the same. If assembling cables, refer to ●*Cable with Loose Wires at One End for CN1 Connection Diagram* of JZSP-CSI01-□-E Cable on the next page.

Selecting Cables Units: mm

(3) Cable with Loose Wires at One End for CN1

• External Dimensions of Cable (Units: mm)

SERVOPACK End
Connector 10150-6000EL (50P)*
Case 10350-52Z0-008*



* : Manufactured by Sumitomo 3M Ltd.

Model	Cable Length (L)
JZSP-CSI01-1-E	1 m
JZSP-CSI01-2-E	2 m
JZSP-CSI01-3-E	3 m

● Cable with Loose Wires at One End for CN1

Connection Diagram of JZSP-CSI01-□-E Cable

SERVOPACK End

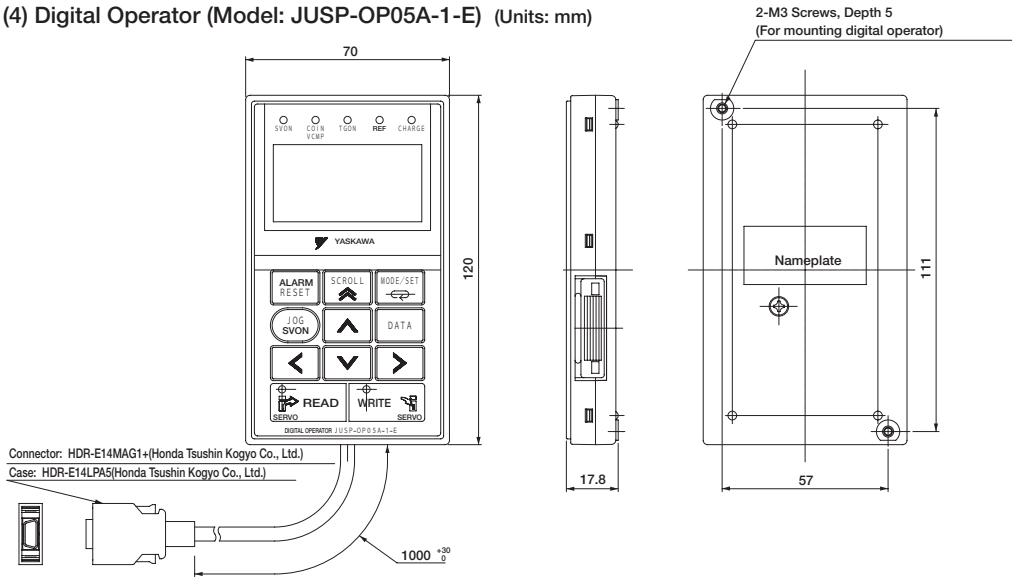
Pin No.	Signal	Wire Color	Marking		Lead Marker
			Color	Dots	
1	SG	Orange	Red	1	1
3	PL1	Orange	Black	1	3
2	SG	Gray	Red	1	2
4	SEN	Gray	Black	1	4
5	V-REF	White	Red	1	5
6	SG	White	Black	1	6
7	PULS	Yellow	Red	1	7
8	/PULS	Yellow	Black	1	8
9	T-REF	Pink	Red	1	9
10	SG	Pink	Black	1	10
11	SIGN	Orange	Red	2	11
12	/SIGN	Orange	Black	2	12
13	PL2	Gray	Red	2	13
14	/CLR	White	Red	2	14
15	CLR	White	Black	2	15
16	–	Gray	Black	2	16
17	–	Yellow	Red	2	17
18	PL3	Yellow	Black	2	18
19	PCO	Pink	Red	2	19
20	/PCO	Pink	Black	2	20
21	BAT (+)	Orange	Red	3	21
22	BAT (–)	Orange	Black	3	22
23	–	Gray	Red	3	23
24	–	Gray	Black	3	24
25	/V-CMP+	White	Red	3	25
26	/V-CMP–	White	Black	3	26
27	/TGON+	Yellow	Red	3	27
28	/TGON–	Yellow	Black	3	28
29	/S-RDY+	Pink	Red	3	29
30	/S-RDY–	Pink	Black	3	30
31	ALM+	Orange	Red	4	31
32	ALM–	Orange	Black	4	32
33	PAO	Gray	Red	4	33
34	/PAO	Gray	Black	4	34
35	PBO	White	Red	4	35
36	/PBO	White	Black	4	36
37	ALO1	Yellow	Red	4	37
38	ALO2	Yellow	Black	4	38
39	ALO3	Pink	Red	4	39
40	/S-ON	Pink	Black	4	40
41	/P-CON	Orange	Red	5	41
42	P-OT	Orange	Black	5	42
43	N-OT	Gray	Red	5	43
44	/ALM-RST	Gray	Black	5	44
45	/P-CL	White	Red	5	45
46	/N-CL	White	Black	5	46
47	+24V-IN	Yellow	Red	5	47
48	–	Pink	Red	5	48
49	–	Pink	Black	5	49
50	–	Yellow	Black	5	50
Case	Shield				

Host Controller End

: Represents twisted-pair wires.

Selecting Cables

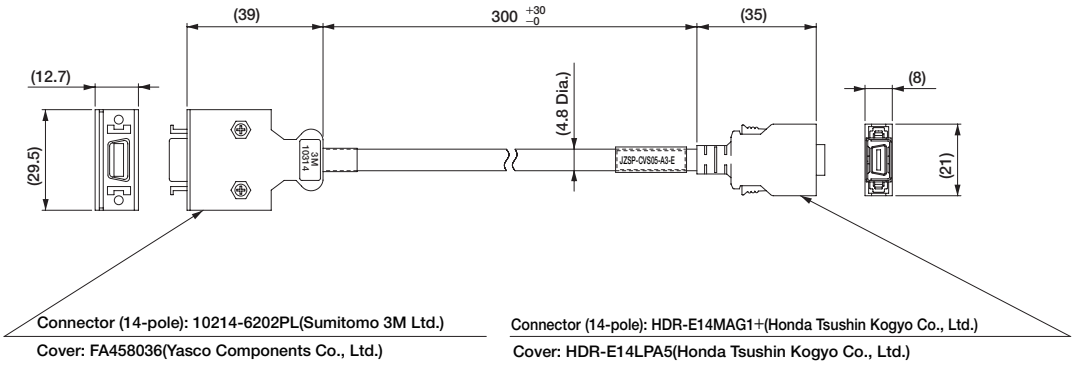
(4) Digital Operator (Model: JUSP-OP05A-1-E) (Units: mm)



(5) Digital Operator Converter Cable for CN3 (Model: JZSP-CVS05-A3-E)

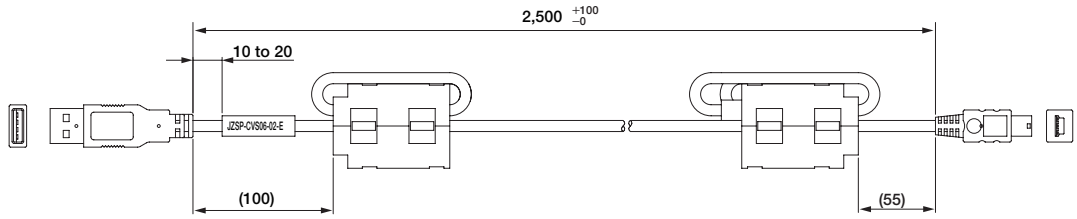
A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-Ⅴ series SERVOPACKs.

- External Dimensions (Units: mm)



(6) Connection Cable for Personal Computer for CN7 (Model: JZSP-CVS06-02-E)

- External Dimensions (Units: mm)

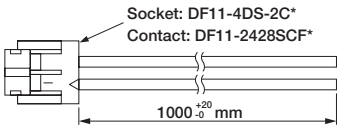


IMPORTANT Use a cable specified by Yaskawa.
When using other cables, operation cannot be guaranteed.

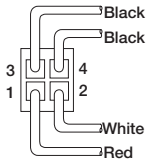
Selecting Cables Units: mm

(7) Cable for Analog Monitor for CN5 (Model: JZSP-CA01-E)

• External Dimensions (Units: mm)



* : Manufactured by Hirose Electric Corporation.



View from Cable End

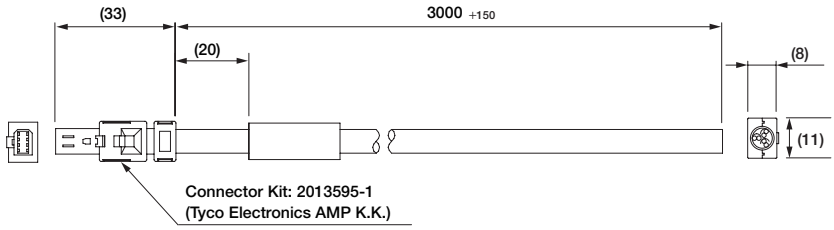
• Specifications

Pin No.	Cable Color	Signal	Standard Settings
1	Red	Analog Monitor 2	Motor speed : 1V/1000 min-1
2	White	Analog Monitor 1	Torque reference : 1V/100 rated torque
3, 4	Black (2 cables)	GND(0V)	–

Note : The specifications above are factory settings. Monitor specifications can be changed by changing parameters Pn006 and Pn007.

(8) Cable with Connector for CN8 (Model: JZSP-CVH03-03-E)

• External Dimensions (Units: mm)

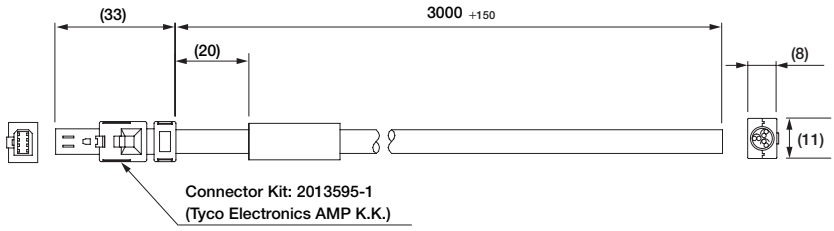


• Specifications

Pin No.	Signal	Lead Color	Marking Color
1	Not used	–	–
2	Not used	–	–
3	/HWBB1–	White	Black
4	/HWBB1+	White	Red
5	/HWBB2–	Gray	Black
6	/HWBB2+	Gray	Red
7	EDM1–	Orange	Black
8	EDM1+	Orange	Red

(Model: JZSP-CVH03-03-E-G3)

• Dimensional Drawings



• Specifications

Pin No.	Signal	Lead Color	Marking Color
1	Not used	–	–
2	Not used	–	–
3	/HWBB1–	White	–
4	/HWBB1+	Brown	–
5	/HWBB2–	Green	–
6	/HWBB2+	Yellow	–
7	EDM1–	Grey	–
8	EDM1+	Pink	–

MECHATROLINK-Ⅱ Communications Reference Type SERVOPACKs

SGDV-□□□□11

(For Rotary Servomotors)

SGDV-□□□□15

(For Linear Servomotors)

Model Designations

S G D V- R70 A 11 A 000 00 0

1st+2nd+3rd digits	4th digit	5th+6th digits	7th digit	8th+9th+10th digits	11th+12th digits	13th digit
R70	A	11	A	000	00	0

Σ-**V** Series
SGDV
SERVOPACK

1st+2nd+3rd digits Current

Voltage	Code	Applicable Servomotor Max. Capacity kW
Three-phase 200 V	R70*1	0.05
	R90*1	0.1
	1R6*1	0.2
	2R8*1	0.4
	3R8	0.5
	5R5*1	0.75
	7R6	1.0
	120*2	1.5
	180	2.0
	200	3.0
	330	5.0
	470	6.0
	550	7.5
	590	11
	780	15
Three-phase 400 V	1R9	0.5
	3R5	1.0
	5R4	1.5
	8R4	2.0
	120	3.0
	170	5.0
	210	6.0
	260	7.5
	280	11
	370	15

4th digit Power Supply Voltage

Code	Specifications
A	Three-phase 200 VAC
D	Three-phase 400 VAC

5th+6th digits Interface

Code	Specifications
11	MECHATROLINK- communications Reference Type (for rotary servomotors)
15	MECHATROLINK- communications Reference Type (for linear servomotors)

7th digit Design Revision Order

A, B...

8th+9th+10th digits Options (hardware)

Code	Specifications
000	Base-mounted (standard)
001	Rack-mounted*3
002	Varnished
003	Rack-mounted*3 and Varnished
008	Single-phase 200 VAC input (Model: SGDV-120A11A008000)
020	Dynamic brake (400 V SERVOPACKs only)

11th+12th digits Options (software)

Code	Specifications
00	Standard

13th digit Options (parameter)

Code	Specifications
0	Standard

*1: These amplifiers can be powered with single or three-phase.
*2: Single-phase 200 VAC SERVOPACKs are also available. (Model: SGDV-120A11A008000)
*3: SERVOPACKs of 6 kW or more are duct-ventilated.
Note: If the option codes digits 8 to 13 are all zeros, they are omitted.

Features

● Real-time communications

MECHATROLINK-Ⅱ communications enable high-speed control for 30 stations at a maximum transmission speed of 10 Mbps in a transmission cycle from 250 μs to 4 ms (user setting). Such a high transmission speed allows real-time transmission of various data required for control.

● Cost savings

Thirty stations can be connected to a single MECHATROLINK-Ⅱ transmission line, so wiring costs and time are greatly reduced. Also, only one signal connector is required on the host controller. And, the all-digital network eliminates the need for conversion from digital to analog for speed/torque references and for a pulse generator to generate position references.

● High-precision motion control

The SGDV SERVOPACK when connected to the host controller in the MECHATROLINK-Ⅱ network provides not only torque, position, and speed control but also synchronized phase control that requires advanced control technology. The control mode can be changed online so that the machine can move smoothly in complex motions with great efficiency.

Ratings

Single-phase 200 V

SERVOPACK Model SGDV-□□□□		R70A	R90A	1R6A	2R8A	5R5A	120A*
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4	0.75	1.5
Continuous Output Current	Arms	0.66	0.91	1.6	2.8	5.5	11.6
Max. Output Current	Arms	2.1	2.9	5.8	9.3	16.9	28
Regenerative Resistors		None or external				Built-in or external	
Main Circuit*		Single-phase 200 to 230 VAC+10% to -15% 50/60 Hz					
Control Circuit*		Single-phase 200 to 230 VAC+10% to -15% 50/60 Hz					

*: The rated voltage is 220 to 230 VAC for the SGDV-120A11A008000 SERVOPACK.

Three-phase 200 V

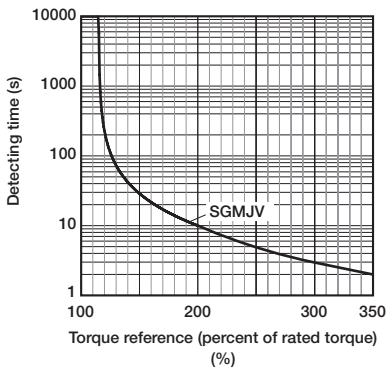
SERVOPACK Model SGDV-□□□□		R70A	R90A	1R6A	2R8A	3R8A	5R5A	7R6A	120A	180A	200A	330A	470A	550A	590A	780A
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4	0.5	0.75	1.0	1.5	2.0	3.0	5.0	6	7.5	11	15
Continuous Output Current	Arms	0.66	0.91	1.6	2.8	3.8	5.5	7.6	11.6	18.5	19.6	32.9	46.9	54.7	58.6	78
Max. Output Current	Arms	2.1	2.9	5.8	9.3	11	16.9	17	28	42	56	84	110	130	140	170
Regenerative Resistors		None or external				Built-in or external							External			
Main Circuit		Three-phase 200 to 230 VAC+10% to -15% 50/60 Hz														
Control Circuit		Single-phase 200 to 230 VAC+10% to -15% 50/60 Hz														

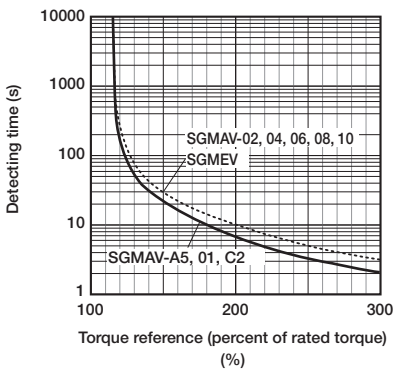
Three-phase 400 V

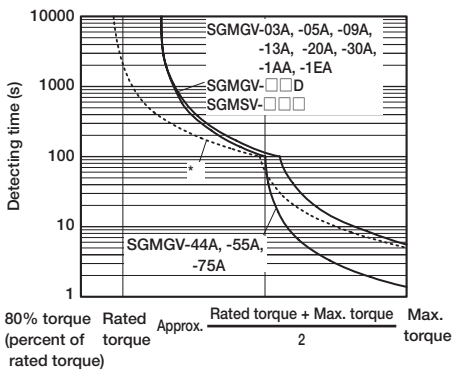
SERVOPACK Model SGDV-□□□□		1R9D	3R5D	5R4D	8R4D	120D	170D	210D	260D	280D	370D
Applicable Servomotor Max. Capacity	kW	0.5	1.0	1.5	2.0	3.0	5.0	6	7.5	11	15
Continuous Output Current	Arms	1.9	3.5	5.4	8.4	11.9	16.5	20.8	25.7	28.1	37.2
Max. Output Current	Arms	5.5	8.5	14	20	28	42	55	65	70	85
Regenerative Resistors		Built-in or external						External			
Main Circuit		Three-phase 380 to 480 VAC+10% to -15% 50/60 Hz									
Control Circuit		24 VDC ±15%									

Note: The entire over voltage category is Ⅲ.

● SERVOPACK Overload Characteristics







Note: Overload characteristics shown above do not guarantee continuous duty of 100% or more output. Use a servomotor with effective torque within the continuous duty zone of Torque-Motor Speed Characteristics.

*: The dotted line indicates the characteristics of a combination of SGDV-200A SERVOPACKs and SGMGV-30A servomotors.

Specifications

Items			Specifications	
Control Method			IGBT PWM control, sine-wave driven	
Feedback	Rotary Servomotors		Serial encoder: 13-bit (incremental encoder) : 17-bit (incremental/absolute encoder) : 20-bit (incremental/absolute encoder)	
	With Linear Servomotors		Absolute linear scale (The signal resolution varies depending on the absolute linear scale.) Incremental linear scale (The signal resolution varies depending on the incremental linear scale or serial converter unit.)	
Operating Conditions	Ambient Temperature		0 to +55°C	
	Storage Temperature		−20 to +85°C	
	Ambient Humidity		90%RH or less	With no freezing or condensation
	Storage Humidity		90%RH or less	
	Vibration Resistance		4.9 m/s²	
	Shock Resistance		19.6 m/s²	
	Protection Class		IP10	An environment that satisfies the following conditions. • Free of corrosive or flammable gases • Free of exposure to water, oil, or chemicals • Free of dust, salts, or iron dust
	Pollution Degree		2	
	Altitude		1000 m or less	
	Others		Do not use SERVOPACKs in the following locations: • Locations subject to static electricity noise, strong electromagnetic/magnetic fields, radioactivity	
Applicable Standards			UL508C EN50178, EN55011/A2 group1 classA, EN61000-6-2, EN61800-3, EN61800-5-1, EN954-1, IEC61508-1 to 4	
Mounting			Standard: Base-mounted Optional: Rack-mounted, Duct-ventilated	
Performance	Speed Control Range		1:5000 (The lower limit of the speed control range must be lower than the point at which the rated torque does not cause the servomotor to stop.)	
	Speed Regulation*1	Load Fluctuation	0% to 100% load: ±0.01% max. (at rated speed)	
		Voltage Fluctuation	Rated voltage: ±10% : 0% (at rated speed)	
		Temperature Fluctuation	25±25°C : ±0.1% max. (at rated speed)	
	Torque Control Tolerance (Repeatability)		±1%	
	Soft Start Time Setting		0 to 10 s (can be set individually for acceleration and deceleration.)	
Communications	RS-422A Communications	Interface	Digital operator (JUSP-OP05A-1-E), personal computer (can be connected with SigmaWin+)	
		1:N communications	RS-422A port: N=15 max. available	
		Axis address setting	Set by parameters	
	USB Communications	Interface	Personal computer (can be connected with SigmaWin+.)	
		Communications Standard	Compliant with USB1.1 standard (12 Mbps)	
Display			CHARGE indicator	
Analog Monitor			Number of points: 2 Output voltage: ±10 VDC (linearity effective range ±8 V) Resolution: 16 bit Accuracy: ±20 mV (Typ) Max. output current: ±10 mA Settling time (±1%): 1.2 ms (Typ)	
Dynamic Brake (DB)			Activated when a servo alarm or overtravelling (OT) occurs, or when the power supply for the main circuit or servomotor is OFF.	
Regenerative Processing			Included (For more information, refer to the previous page)	
Overtravelling (OT) Prevention			Dynamic brake stop at P-OT or N-OT, deceleration to a stop, or free run to a stop	
Protective Functions			Overcurrent, Overvoltage, low voltage, overload, regeneration error, etc.	
Utility Functions			Gain adjustment, alarm history, JOG operation, origin search, etc.	
Safety Functions		Input	/HWBB1, /HWBB2: Baseblock signal for power module	
		Output	EDM1: Status monitor (fixed output) of built-in safety circuit	
		Applicable Standards*2	EN954 category 3, IEC61508 SIL2	
Option Module			Fully-closed Module	

*1: Speed regulation is defined as follows:

$$\text{Speed regulation} = \frac{\text{No-load motor speed} - \text{Total load motor speed}}{\text{Rated motor speed}} \times 100\%$$

The motor speed may change due to voltage fluctuation or temperature fluctuation.
The ratio of speed changes to the rated speed represent speed regulation due to voltage and temperature fluctuations.

*2: Perform risk assessment for the system and confirm that the safety requirements for the standards are fulfilled before using the HWBB function.

Specifications

● Rotary Servomotors

Items			Specifications	
I/O Signal	Encoder Output Pulses		Phase A, phase B, phase C: line driver output The number of dividing pulse: Any setting ratio is available.	
	Sequence Input	Fixed Input	SEN signal	
		Input Signals which can be allocated	Number of Channels	7 channels
			Function	• Homing deceleration switch signal (/DEC) • External latch signals (/EXT 1 to 3) • Forward run prohibited (P-OT), reverse run prohibited (N-OT) • Forward external torque limit (/P-CL), reverse external torque limit (/N-CL) Positive and negative logic can be changed.
	Sequence Output	Fixed Output	Servo alarm (ALM)	
		Output Signals which can be allocated	Number of Channels	3 channels
			Function	• Positioning completion (/COIN) • Speed limit detection (/VLT) • Speed coincidence detection (/V-CMP) • Brake (/BK) • Rotation detection (/TGON) • Warning (/WARN) • Servo ready (/S-RDY) • Near (/NEAR) • Torque limit detection (/CLT) Positive and negative logic can be changed.
Panel Operator		Display Unit	One 7-segment LED	
		Switch	Rotary switch: 16 positions, DIP switch: 4 poles	
MECHATROLINK Communications		Communications Protocol	MECHATROLINK-	MECHATROLINK-
		Transmission Speed	10 Mbps	4 Mbps
		Transmission Cycle	250 μs, 0.5 to 4.0 ms (multiple of 0.5 ms)	2 ms
		Number of Words for Link Transmission	Can be switched between 17-bytes /station and 32-bytes / station.	17-bytes /station
		Station Address	41H to 5FH (max. number of slaves: 30)	
Command Method		Performance	Position control, speed control, and torque control through MECHATROLINK communications	
		Command Input	MECHATROLINK commands (for sequence, motion, data setting/reference, monitor, adjustment, and other commands.)	

● Linear Servomotors

Items			Specifications	
I/O Signal	Encoder Output Pulses		Phase A, phase B, phase C: line driver output The number of dividing pulse: Any setting ratio is available.	
	Sequence Input	Fixed Input	SEN signal	
		Input Signals which can be allocated	Number of Channels	7 channels
			Function	• Homing deceleration switch signal (/DEC) • External latch signals (/EXT 1 to 3) • Forward run prohibited (P-OT), reverse run prohibited (N-OT) • Forward external force limit (/P-CL), reverse external force limit (/N-CL) Positive and negative logic can be changed.
	Sequence Output	Fixed Output	Servo alarm (ALM)	
		Output Signals which can be allocated	Number of Channels	3 channels
			Function	• Positioning completion (/COIN) • Speed limit detection (/VLT) • Speed coincidence detection (/V-CMP) • Brake (/BK) • Servomotor movement detection (/TGON) • Warning (/WARN) • Servo ready (/S-RDY) • Near (/NEAR) • Force limit detection (/CLT) Positive and negative logic can be changed.
Panel Operator		Display Unit	One 7-segment LED	
		Switch	Rotary switch: 16 positions, piano switch: 4 poles	
MECHATROLINK Communications		Communications Protocol	MECHATROLINK-Ⅱ	MECHATROLINK-Ⅰ
		Transmission Speed	10 Mbps	4 Mbps
		Transmission Cycle	250 μs, 0.5 to 4.0 ms (multiple of 0.5 ms)	2 ms
		Number of Words for Link Transmission	Can be switched between 17-bytes /station and 32-bytes / station.	17-bytes /station
		Station Address	41H to 5FH (max. number of slaves: 30)	
Command Method		Performance	Position control, speed control, and force control through MECHATROLINK-Ⅱ communications	
		Command Input	MECHATROLINK commands and MECHATROLINK-Ⅱ commands (for sequence, motion, data setting/reference, monitor, adjustment, and other commands.)	

Power Supply Capacities and Power Losses

The following table shows SERVOPACK's power supply capacities and power losses at the rated output.

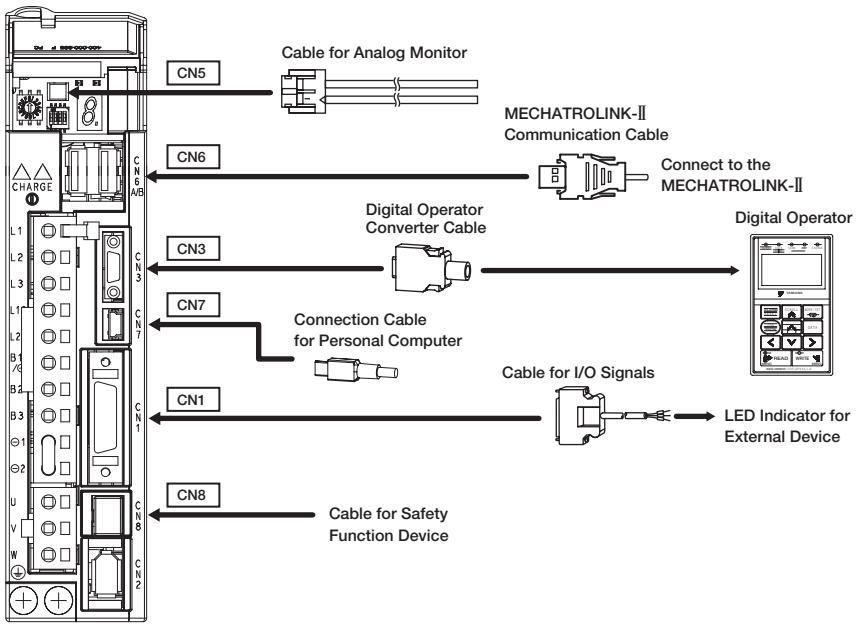
Main Circuit Power Supply	Applicable Servomotor Max. Capacity kW	SERVOPACK Model SGDV-	Power Supply Capacity kVA	Output Current Arms	Main Circuit Power Loss W	Regenerative Resistor Power Loss W	Control Circuit Power Loss W	Total Power Loss W
Single-phase 200 V	0.05	R70A	0.2	0.66	5.2	—	17	22.2
	0.1	R90A	0.3	0.91	7.4			24.4
	0.2	1R6A	0.7	1.6	13.7			30.7
	0.4	2R8A	1.2	2.8	24.9			41.9
	0.75	5R5A	1.9	5.5	52.7	8		77.7
	1.5	120A	4	11.6	68.2	10	22	100.2
Three-phase 200 V	0.05	R70A	0.2	0.66	5.1	—	17	22.1
	0.1	R90A	0.3	0.91	7.3			24.3
	0.2	1R6A	0.6	1.6	13.5			30.5
	0.4	2R8A	1	2.8	24.0			41.0
	0.5	3R8A	1.4	3.8	20.1	8		45.1
	0.75	5R5A	1.6	5.5	43.8			68.8
	1.0	7R6A	2.3	7.6	53.6			78.6
	1.5	120A	3.2	11.6	65.8	10	22	97.8
	2.0	180A	4	18.5	111.9	16		149.9
	3.0	200A	5.9	19.6	113.8			161.4
	5.0	330A	7.5	32.9	263.7	36	27	326.7
	6.0	470A	10.7	46.9	279.4	(180)*1	33	312.4
	7.5	550A	14.6	54.7	357.8	(350)*2		390.8
	11	590A	21.7	58.6	431.7		48	479.7
	15	780A	29.6	78	599.0			647.0
Three-phase 400 V	0.5	1R9D	1.1	1.9	24.6	14	21	59.6
	1.0	3R5D	2.3	3.5	46.1			81.1
	1.5	5R4D	3.5	5.4	71.3			106.3
	2.0	8R4D	4.5	8.4	77.9	28	25	130.9
	3.0	120D	7.1	11.9	108.7			161.7
	5.0	170D	11.7	16.5	161.1	36	24	221.1
	6.0	210D	12.4	20.8	172.7	(180)*3	27	199.7
	7.5	260D	14.4	25.7	218.6			245.6
	11	280D	21.9	28.1	294.6	(350)*4	30	324.6
	15	370D	30.6	37.2	403.8			433.8

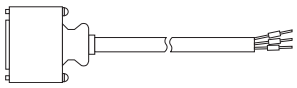
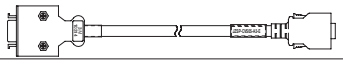
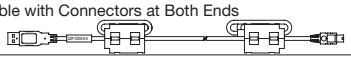
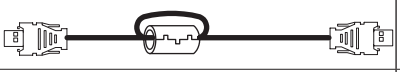
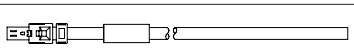
*1: For the optional JUSP-RA04-E regenerative resistor unit.
*2: For the optional JUSP-RA05-E regenerative resistor unit.
*3: For the optional JUSP-RA18-E regenerative resistor unit.
*4: For the optional JUSP-RA19-E regenerative resistor unit.

Notes: 1 SGDV-R70A, -R90A, -1R6A, and -2R8A SERVOPACKs do not have built-in regenerative resistors.
If the regenerative energy exceeds the specified value, connect an external regenerative resistor (optional).
2 SGDV-470A, -550A, -590A, -780A, -210D, -260D, -280D, -370D SERVOPACKs do not have built-in regenerative resistors.
Be sure to connect a regenerative resistor unit (optional) or an external regenerative resistor (optional). For selection details, refer to page 364.
3 Regenerative resistor power losses are allowable losses. Take the following action if this value is exceeded.
- Remove the lead or short bar that is short-circuiting the SERVOPACK main circuit terminal B2 and B3.
(SGDV-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, -330A, or 400-V class SERVOPACKs.)
- Install an external regenerative resistor (optional). For selection details, refer to page 364.

Selecting Cables

● Cables for CN1 CN3 CN5 CN6 CN7 CN8 (MECHATROLINK-Ⅱ Communications Reference Type SERVOPACKs)



Name		Length	Order No.	Specifications	Details
CN1 Cables for I/O Signals	Connector Kit		JZSP-CSI9-2-E	Soldered 	(1)
	Connector Terminal Converter Unit	0.5 m	JUSP-TA26P-E	Terminal Block and Connection Cable 	(2)
		1 m	JUSP-TA26P-1-E		
		2 m	JUSP-TA26P-2-E		
	Cable with Loose wire at One End	1 m	JZSP-CSI02-1-E		(3)
		2 m	JZSP-CSI02-2-E		
		3 m	JZSP-CSI02-3-E		
CN3	Digital Operator		JUSP-OP05A-1-E	With Connection Cable (1 m) 	(4)
	Digital Operator Converter Cable*1	0.3 m	JZSP-CVS05-A3-E	Cable with Connectors at Both Ends 	(5)
CN7 Connection Cables for Personal Computer		2.5 m	JZSP-CVS06-02-E	Cable with Connectors at Both Ends 	(10)
CN6A CN6B MECHATROLINK-Ⅱ Communication Cable	Cables with Connectors at Both Ends	0.5 to 50 m	JEPMC-W6002-□□-E		(7)
	Cables with Connectors at Both Ends (with Ferrite Core)	0.5 to 50 m	JEPMC-W6003-□□-E		(8)
	Terminator		JEPMC-W6022-E		(9)
CN5 Cables for Analog Monitor		1 m	JZSP-CA01-E	SERVOPACK End 	(6)
CN8 Cable for Safety Function Device	Cables with Connector*2	3 m	**JZSP-CVH03-03-E** **JZSP-CVH03-03-E-G3**		(11)
	Connector kit*3		Contact Tyco Electronics AMP K.K. Product name : Industrial Mini I/O D-shape Type1 Plug Connector Kit Model : 2013595-1		

*1 : A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-Ⅴ series SERVOPACKs.
*2 : When using the safety function, connect this cable to the safety devices.
Even when not using the safety function, use SERVOPACKs with the Safe Jumper Connector (model: JZSP-CVH05-E) connected.
*3 : Use the connector kit when you make cables yourself.

Selecting Cables

(1) Connector Kit for CN1

Use the following connector and cable to assemble the cable. The CN1 connector kit includes one case and one connector.

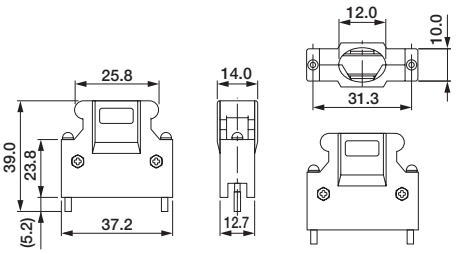
Connector Kit Model	Case		Connector	
	Model	Qty	Model	Qty
JZSP-CSI9-2-E	10326-52A0-008*	1 set	10126-3000PE* (Soldered)	1

* : Manufactured by Sumitomo 3M Ltd.

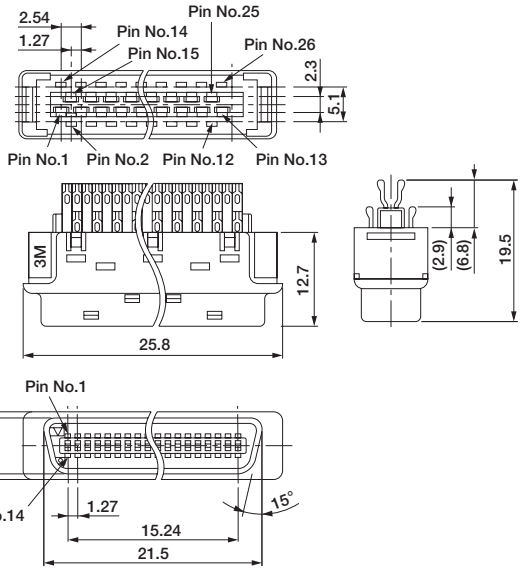
• Cable Size

Item	Specifications
Cable	Use twisted-pair or twisted-pair shielded wire.
Applicable Wires	AWG24, 26, 28, 30
Cable Finished Diameter	16 dia. max.

• External Dimensions of Case (Units: mm)

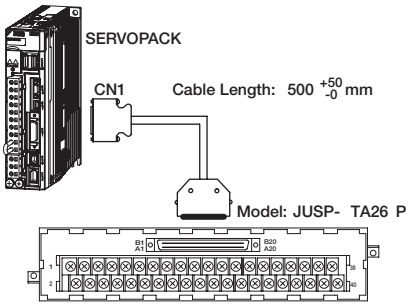


• External Dimensions of Connector (Units: mm)

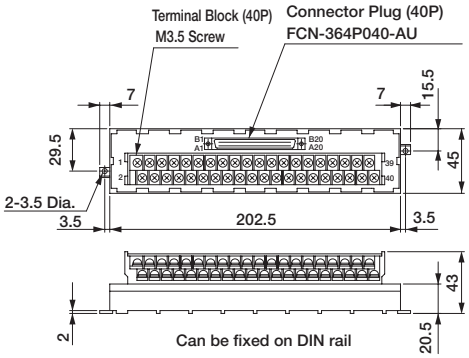


(2) Connector Terminal Converter Unit for CN1

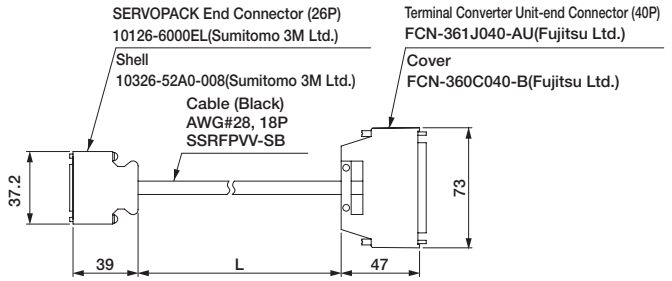
• Configurations



• External Dimensions of Terminal Block (Units: mm)



• External Dimensions of Cable (Units: mm)



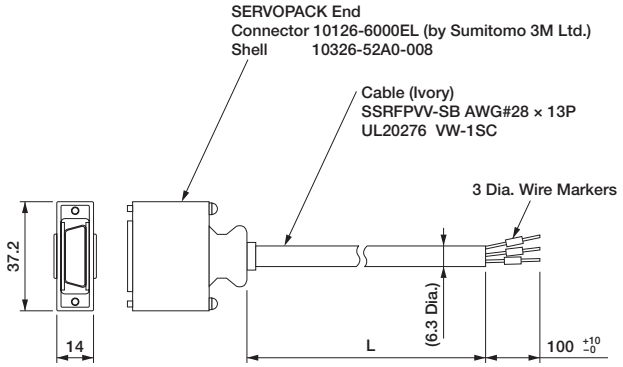
Model	Cable Length (L)	Approx. Mass
JUSP-TA26P-E	0.5 m	100 g
JUSP-TA26P-1-E	1 m	200 g
JUSP-TA26P-2-E	2 m	400 g

Note: The pin number in the SERVOPACK connector and the pin number in the terminal block are the same. Pin numbers 1 to 26 are used in the terminal block. Do not use a pin number of 27 or higher.
If assembling cables, refer to ●*Cable with Loose Wires at One End for CN1 Connection Diagram of JZSP-CSI02-□-E Cable* on the next page.

Selecting Cables

(3) Cable with Loose Wires at One End for CN1

External Dimensions of Cable (Units: mm)



Model	Cable Length
JZSP-CSI02-1-E	1 m
JZSP-CSI02-2-E	2 m
JZSP-CSI02-3-E	3 m

● Cable with Loose Wires at One End for CN1

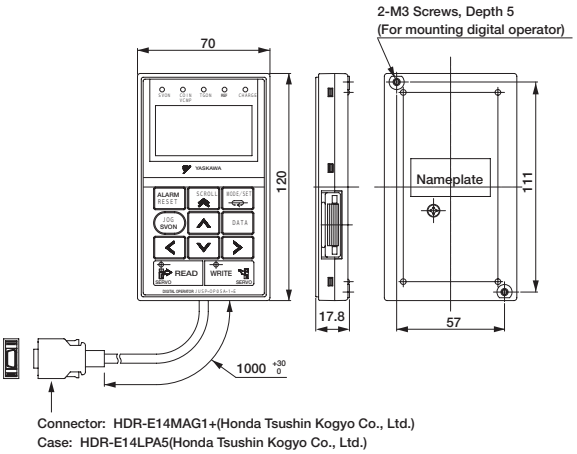
Connection Diagram of JZSP-CSI02-□-E Cable

SERVOPACK End					Host Controller End
Pin No.	Signal	Wire Color	Marking		Lead Marker
			Color	Dots	
1	/SO1+	Blue	Red	1	1
2	/SO1−	Blue	Black	1	2
3	ALM+	Pink	Red	1	3
4	ALM−	Pink	Black	1	4
5	5	Green	Red	1	5
6	+24VIN	Green	Black	1	6
7	P-OT	Orange	Red	1	7
8	N-OT	Orange	Black	1	8
9	/DEC	Gray	Red	1	9
10	/EXT1	Gray	Black	1	10
11	/EXT2	Blue	Red	2	11
12	/EXT3	Blue	Black	2	12
13	/S10	Pink	Red	2	13
14	BAT (+)	Green	Red	2	14
15	BAT (−)	Green	Black	2	15
16	SG	Pink	Black	2	16
17	PAO	Orange	Red	2	17
18	/PAO	Orange	Black	2	18
19	PBO	Gray	Red	2	19
20	/PBO	Gray	Black	2	20
21	PCO	Blue	Red	3	21
22	/PCO	Blue	Black	3	22
23	/SO2+	Pink	Red	3	23
24	/SO2−	Pink	Black	3	24
25	/SO3+	Green	Red	3	25
26	/SO3−	Green	Black	3	26

: Represents twisted-pair wires.

(4) Digital Operator (Model: JUSP-OP05A-1-E)

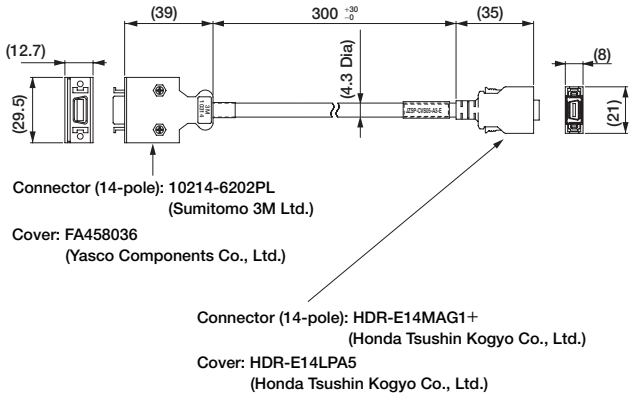
(Units: mm)



(5) Digital Operator Converter Cable for CN3 (Model: JZSP-CVS05-A3-E)

A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-Ⅴ series SERVOPACKs.

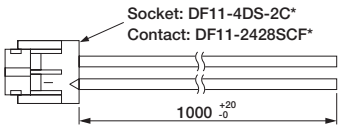
• External Dimensions (Units: mm)



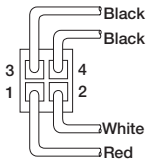
Selecting Cables

(6) Cable for Analog Monitor for CN5 (Model: JZSP-CA01-E)

- External Dimensions (Units: mm)



* : Manufactured by Hirose Electric Corporation.



View from Cable End

- Specifications

Pin No.	Cable Color	Signal	Standard Settings
1	Red	Analog Monitor 2	Motor speed : 1V/1000 min-1
2	White	Analog Monitor 1	Torque reference : 1V/100% rated torque
3, 4	Black (2 cables)	GND(0V)	–

Note : The specifications above are factory settings. Monitor specifications can be changed by changing parameters Pn006 and Pn007.

(7) MECHATROLINK-Ⅱ Communications Cable for CN6 (Model: JEPMC-W6002-□□-E)

- External Dimensions (Units: mm)

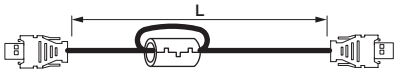
Cable with Connectors at Both Ends

Model	Cable Length(L)
JEPMC-W6002-A5-E	0.5 m
JEPMC-W6002-01-E	1.0 m
JEPMC-W6002-03-E	3.0 m
JEPMC-W6002-05-E	5.0 m
JEPMC-W6002-10-E	10.0 m
JEPMC-W6002-20-E	20.0 m
JEPMC-W6002-30-E	30.0 m
JEPMC-W6002-40-E	40.0 m
JEPMC-W6002-50-E	50.0 m

(8) MECHATROLINK-Ⅱ Communications Cable for CN6 (Model: JEPMC-W6003- -E)

- External Dimensions (Units: mm)

Cable with Connectors at Both Ends (with Ferrite Core)

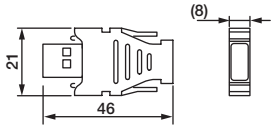


Model	Cable Length (L)
JEPMC-W6003-A5-E	0.5 m
JEPMC-W6003-01-E	1.0 m
JEPMC-W6003-03-E	3.0 m
JEPMC-W6003-05-E	5.0 m
JEPMC-W6003-10-E	10.0 m
JEPMC-W6003-20-E	20.0 m
JEPMC-W6003-30-E	30.0 m
JEPMC-W6003-40-E	40.0 m
JEPMC-W6003-50-E	50.0 m

IMPORTANT Use a MECHATROLINK-Ⅱ communications cable specified by Yaskawa. When using other cables, noise resistance may be reduced, and operation cannot be guaranteed.

(9) MECHATROLINK-Ⅱ Terminator for CN6 (Model : JEPMC-W6022-E)

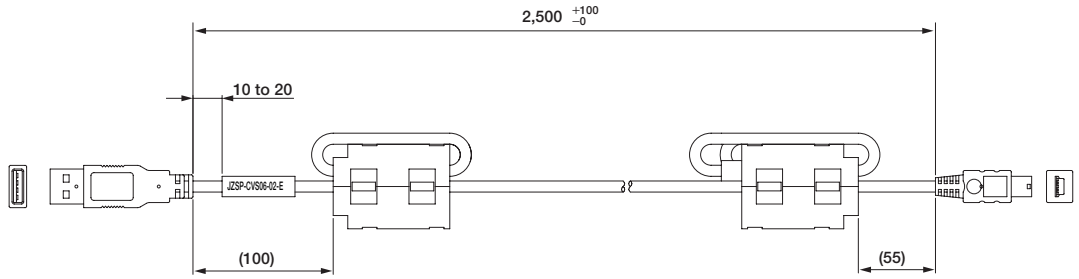
- External Dimensions (Units: mm)



Selecting Cables

(10) Connection Cable for Personal Computer for CN7 (Model: JZSP-CVS06-02-E)

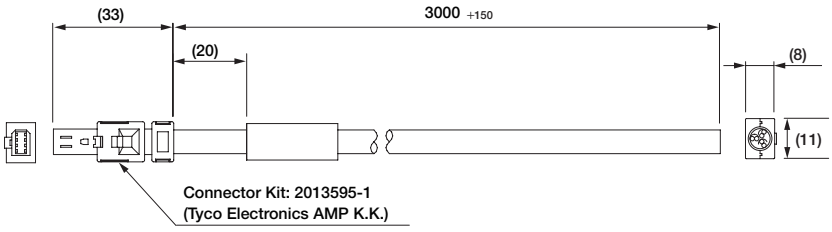
• External Dimensions (Units: mm)



IMPORTANT Use a cable specified by Yaskawa.
When using other cables, operation cannot be guaranteed.

(11) Cable with Connector for CN8 (Model: JZSP-CVH03-03-E)

• External Dimensions (Units: mm)

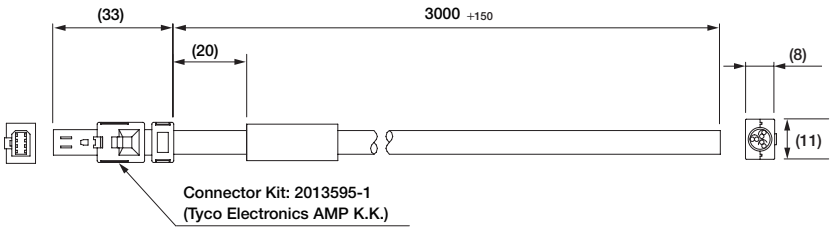


• Specifications

Pin No.	Signal	Lead Color	Marking Color
1	Not used	–	–
2	Not used	–	–
3	/HWBB1–	White	Black
4	/HWBB1+	White	Red
5	/HWBB2–	Gray	Black
6	/HWBB2+	Gray	Red
7	EDM1–	Orange	Black
8	EDM1+	Orange	Red

(Model: JZSP-CVH03-03-E-G3)

• External Dimensions (Units: mm)



• Specifications

Pin No.	Signal	Lead Color	Marking Color
1	Not used	–	–
2	Not used	–	–
3	/HWBB1–	White	–
4	/HWBB1+	Brown	–
5	/HWBB2–	Green	–
6	/HWBB2+	Yellow	–
7	EDM1–	Grey	–
8	EDM1+	Pink	–

MECHATROLINK-Ⅲ Communications Reference Type SERVOPACKs

SGDV-□□□□21
(For Rotary Servomotors)

SGDV-□□□□25
(For Linear Servomotors)

Model Designations

S G D V- R70 A 21 A 000 00 0

- S G D V-: Σ-V Series, SGDV, SERVOPACK
- R70: 1st+2nd+3rd digits
- A: 4th digit
- 21: 5th6th digits
- A: 7th digit
- 000: 8th+9th+10th digits
- 00: 11th12th digits
- 0: 13th digit

1st2nd3rd digits Current

Voltage	Code	Applicable Servomotor Max. Capacity kW
Three-phase 200 V	R70*1	0.05
	R90*1	0.1
	1R6*1	0.2
	2R8*1	0.4
	3R8	0.5
	5R5*1	0.75
	7R6	1.0
	120*2	1.5
	180	2.0
	200	3.0
	330	5.0
	470	6.0
	550	7.5
	590	11
	780	15
Three-phase 400 V	1R9	0.5
	3R5	1.0
	5R4	1.5
	8R4	2.0
	120	3.0
	170	5.0
	210	6.0
	260	7.5
	280	11
	370	15

4th digit Power Supply Voltage

Code	Specifications
F	Single-phase 100 VAC
A	Three-phase 200 VAC
D	Three-phase 400 VAC

5th+6th digits Interface

Code	Specifications
21	MECHATROLINK-Ⅲ communications Reference Type (for rotary servomotors)
25	MECHATROLINK-Ⅲ communications Reference Type (for linear servomotors)

7th digit Design Revision Order

A, B...

8th+9th+10th digits Options (hardware)

Code	Specifications
000	Base-mounted (standard)
001	Rack-mounted
002	Varnished
003	Rack-mounted and Varnished
008	Single-phase 200 VAC input (Model: SGDV-120A21A008000)
020	Dynamic brake (400 V SERVOPACKs only)

11th+12th digits Options (software)

Code	Specifications
00	Standard

13th digit Options (parameter)

Code	Specifications
0	Standard

*1: These amplifiers can be powered with single or three-phase.
*2: Single-phase 200 VAC SERVOPACKs are also available. (Model: SGDV-120A21A008000)
*3: SERVOPACKs of 6 kW or more are duct-ventilated.
Note: If the option codes digits 8 to 13 are all zeros, they are omitted.

Features

● Real-time communications

MECHATROLINK-Ⅲ communications enable high-speed control for 62 stations at a transmission speed of 100 Mbps in a transmission cycle from 125 μs to 4 ms (user setting). Such a high transmission speed allows real-time transmission of various data required for control.

● Cost savings

The 62 stations can be connected to a single MECHATROLINK-Ⅲ transmission line, so wiring costs and time are greatly reduced. Also, only one signal connector is required on the host controller. And, the all-digital network eliminates the need for conversion from digital to analog for speed/torque references and for a pulse generator to generate position references.

● High-precision motion control

The SGDV SERVOPACK when connected to the host controller in the MECHATROLINK-Ⅲ network provides not only torque, position, and speed control but also synchronized phase control that requires advanced control technology. The control mode can be changed online so that the machine can move smoothly in complex motions with great efficiency.

Ratings

Single-phase 200 V

SERVOPACK Model SGDV-□□□□		R70A	R90A	1R6A	2R8A	5R5A	120A*
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4	0.75	1.5
Continuous Output Current	Arms	0.66	0.91	1.6	2.8	5.5	11.6
Max. Output Current	Arms	2.1	2.9	5.8	9.3	16.9	28
Regenerative Resistors		None or external				Built-in or external	
Main Circuit		Single-phase 200 to 230 VAC+10% to -15% 50/60 Hz					
Control Circuit		Single-phase 200 to 230 VAC+10% to -15% 50/60 Hz					

*: The rated voltage is 220 to 230 VAC for the SGDV-120A21A008000 SERVOPACK.

Three-phase 200 V

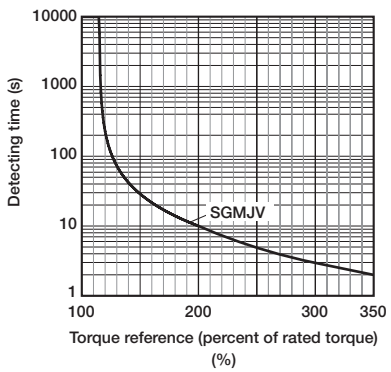
SERVOPACK Model SGDV-□□□□		R70A	R90A	1R6A	2R8A	3R8A	5R5A	7R6A	120A	180A	200A	330A	470A	550A	590A	780A
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4	0.5	0.75	1.0	1.5	2.0	3.0	5.0	6	7.5	11	15
Continuous Output Current	Arms	0.66	0.91	1.6	2.8	3.8	5.5	7.6	11.6	18.5	19.6	32.9	46.9	54.7	58.6	78
Max. Output Current	Arms	2.1	2.9	5.8	9.3	11	16.9	17	28	42	56	84	110	130	140	170
Regenerative Resistors		None or external				Built-in or external							External			
Main Circuit		Three-phase 200 to 230 VAC+10% to -15% 50/60 Hz														
Control Circuit		Single-phase 200 to 230 VAC+10% to -15% 50/60 Hz														

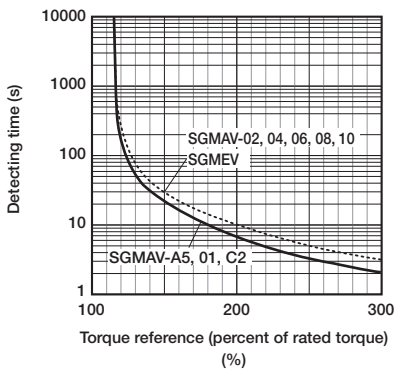
Three-phase 400 V

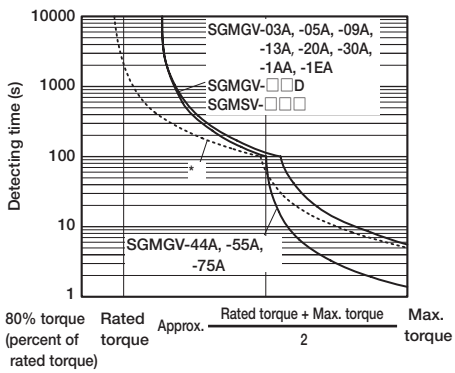
SERVOPACK Model SGDV-□□□□		1R9D	3R5D	5R4D	8R4D	120D	170D	210D	260D	280D	370D
Applicable Servomotor Max. Capacity	kW	0.5	1.0	1.5	2.0	3.0	5.0	6	7.5	11	15
Continuous Output Current	Arms	1.9	3.5	5.4	8.4	11.9	16.5	20.8	25.7	28.1	37.2
Max. Output Current	Arms	5.5	8.5	14	20	28	42	55	65	70	85
Regenerative Resistors		Built-in or external						External			
Main Circuit		Three-phase 380 to 480 VAC+10% to -15% 50/60 Hz									
Control Circuit		24 VDC ±15%									

Note: The entire over voltage category is Ⅲ.

● SERVOPACK Overload Characteristics







Note: Overload characteristics shown above do not guarantee continuous duty of 100% or more output. Use a servomotor with effective torque within the continuous duty zone of *Torque-Motor Speed Characteristics*.

*: The dotted line indicates the characteristics of a combination of SGDV-200A SERVOPACKs and SGMGV-30A servomotors.

Specifications

Items			Specifications	
Control Method			IGBT PWM control, sine-wave driven	
Feedback	Rotary Servomotors		Serial encoder: 13-bit (incremental encoder) : 17-bit (incremental/absolute encoder) : 20-bit (incremental/absolute encoder)	
	With Linear Servomotors		Absolute linear scale (The signal resolution varies depending on the absolute linear scale.) Incremental linear scale (The signal resolution varies depending on the incremental linear scale or serial converter unit.)	
Operating Conditions	Ambient Temperature		0 to +55°C	
	Storage Temperature		−20 to +85°C	
	Ambient Humidity		90%RH or less	With no freezing or condensation
	Storage Humidity		90%RH or less	
	Vibration Resistance		4.9 m/s	
	Shock Resistance		19.6 m/s	
	Protection Class		IP10	An environment that satisfies the following conditions. • Free of corrosive or flammable gases • Free of exposure to water, oil, or chemicals • Free of dust, salts, or iron dust
	Pollution Degree		2	
	Altitude		1000 m or less	
	Others		Do not use SERVOPACKs in the following locations: • Locations subject to static electricity noise, strong electromagnetic/magnetic fields, radioactivity	
Applicable Standards (Pending)			UL508C EN50178, EN55011/A2 group1 classA, EN61000-6-2, EN61800-3, EN61800-5-1, EN954-1, IEC61508-1 to 4	
Mounting			Standard: Base-mounted Optional: Rack-mounted, Duct-ventilated	
Performance	Speed Control Range		1:5000 (The lower limit of the speed control range must be lower than the point at which the rated torque does not cause the servomotor to stop.)	
	Speed Regulation	Load Fluctuation	0% to 100% load: ±0.01% max. (at rated speed)	
		Voltage Fluctuation	Rated voltage: ±10% : 0% (at rated speed)	
		Temperature Fluctuation	25±25°C : ±0.1% max. (at rated speed)	
	Torque Control Tolerance (Repeatability)		±1%	
	Soft Start Time Setting		0 to 10 s (can be set individually for acceleration and deceleration.)	
Communications	RS-422A Communications	Interface	Digital operator (JUSP-OP05A-1-E), personal computer (can be connected with SigmaWin+)	
		1:N communications	RS-422A port: N=15 max. available	
		Axis address setting	Set by parameters	
	USB Communications	Interface	Personal computer (can be connected with SigmaWin+.)	
		Communications Standard	Compliant with USB1.1 standard (12 Mbps)	
Display			CHARGE indicator	
Analog Monitor			Number of points: 2 Output voltage: ±10 VDC (linearity effective range ±8 V) Resolution: 16 bit Accuracy: ±20 mV (Typ) Max. output current: ±10 mA Settling time (±1%): 1.2 ms (Typ)	
Dynamic Brake (DB)			Activated when a servo alarm or overtravelling (OT) occurs, or when the power supply for the main circuit or servomotor is OFF.	
Regenerative Processing			Included (For more information, refer to the previous page.)	
Overtravelling (OT) Prevention			Dynamic brake stop at P-OT or N-OT, deceleration to a stop, or free run to a stop	
Protective Functions			Overcurrent, Overvoltage, low voltage, overload, regeneration error, etc.	
Utility Functions			Gain adjustment, alarm history, JOG operation, origin search, etc.	
Safety Functions		Input	/HWBB1, /HWBB2: Baseblock signal for power module	
		Output	EDM1: Status monitor (fixed output) of built-in safety circuit	
		Applicable Standards (Pending)	EN954 category 3, IEC61508 SIL2	
Option Module			Fully-closed Module	

*1: Speed regulation is defined as follows:

$$\text{Speed regulation} = \frac{\text{No-load motor speed} - \text{Total load motor speed}}{\text{Rated motor speed}} \times 100\%$$

The motor speed may change due to voltage fluctuation or temperature fluctuation.
The ratio of speed changes to the rated speed represent speed regulation due to voltage and temperature fluctuations.

*2: Perform risk assessment for the system and confirm that the safety requirements for the standards are fulfilled before using the HWBB function.

Specifications

● Rotary Servomotors

Items			Specifications	
I/O Signal	Encoder Output Pulses		Phase A, phase B, phase C: line driver output The number of dividing pulse: Any setting ratio is available.	
	Sequence Input	Fixed Input	SEN signal	
		Input Signals which can be allocated	Number of Channels	7 channels
			Function	• Homing deceleration switch signal (/DEC) • External latch signals (/EXT 1 to 3) • Forward run prohibited (P-OT), reverse run prohibited (N-OT) • Forward external torque limit (/P-CL), reverse external torque limit (/N-CL) Positive and negative logic can be changed.
	Sequence Output	Fixed Output	Servo alarm (ALM)	
		Output Signals which can be allocated	Number of Channels	3 channels
			Function	• Positioning completion (/COIN) • Speed limit detection (/VLT) • Speed coincidence detection (/V-CMP) • Brake (/BK) • Rotation detection (/TGON) • Warning (/WARN) • Servo ready (/S-RDY) • Near (/NEAR) • Torque limit detection (/CLT) Positive and negative logic can be changed.
Panel Operator		Display Unit	One 7-segment LED (red) and three LED indicators for MECHATROLINK communications (green)	
		Switch	Rotary switch: 16 positions×2, DIP switch: 4 poles	
MECHATROLINK Communications		Communications Protocol	MECHATROLINK-Ⅲ	
		Transmission Speed	100 Mbps	
		Transmission Cycle	125 μs, 250 μs, 500 μs,750 μs, 1 ms to 4 ms (increments of 0.5 ms)	
		Number of Words for Link Transmission	Can be switched between 16-bytes/station, 32-bytes/station and 48-bytes/station.	
		Station Address	03H to EFH (max. number of slaves: 62)	
Command Method		Performance	Position control, speed control, and torque control through MECHATROLINK communications	
		Command Input	MECHATROLINK commands (for sequence, motion, data setting/reference, monitor, adjustment, and other commands.)	

● Linear Servomotors

Items			Specifications	
I/O Signal	Encoder Output Pulses		Phase A, phase B, phase C: line driver output The number of dividing pulse: Any setting ratio is available.	
	Sequence Input	Fixed Input	SEN signal	
		Input Signals which can be allocated	Number of Channels	7 channels
			Function	• Homing deceleration switch signal (/DEC) • External latch signals (/EXT 1 to 3) • Forward run prohibited (P-OT), reverse run prohibited (N-OT) • Forward external force limit (/P-CL), reverse external force limit (/N-CL) Positive and negative logic can be changed.
	Sequence Output	Fixed Output	Servo alarm (ALM)	
		Output Signals which can be allocated	Number of Channels	3 channels
			Function	• Positioning completion (/COIN) • Speed limit detection (/VLT) • Speed coincidence detection (/V-CMP) • Brake (/BK) • Servomotor movement detection (/TGON) • Warning (/WARN) • Servo ready (/S-RDY) • Near (/NEAR) • Force limit detection (/CLT) Positive and negative logic can be changed.
Panel Operator		Display Unit	One 7-segment LED (red) and three LED indicators for MECHATROLINK communications (green)	
		Switch	Rotary switch: 16 positions×2, DIP switch: 4 poles	
MECHATROLINK Communications		Communications Protocol	MECHATROLINK-Ⅲ	
		Transmission Speed	100 Mbps	
		Transmission Cycle	125 μs, 250 μs, 500 μs,750 μs, 1 ms to 4 ms (increments of 0.5 ms)	
		Number of Words for Link Transmission	Can be switched between 16-bytes/station, 32-bytes/station and 48-bytes/station.	
		Station Address	03H to EFH (max. number of slaves: 62)	
Command Method		Performance	Position control, speed control, and force control through MECHATROLINK communications	
		Command Input	MECHATROLINK commands (for sequence, motion, data setting/reference, monitor, adjustment, and other commands.)	

Power Supply Capacities and Power Losses

The following table shows SERVOPACK's power supply capacities and power losses at the rated output.

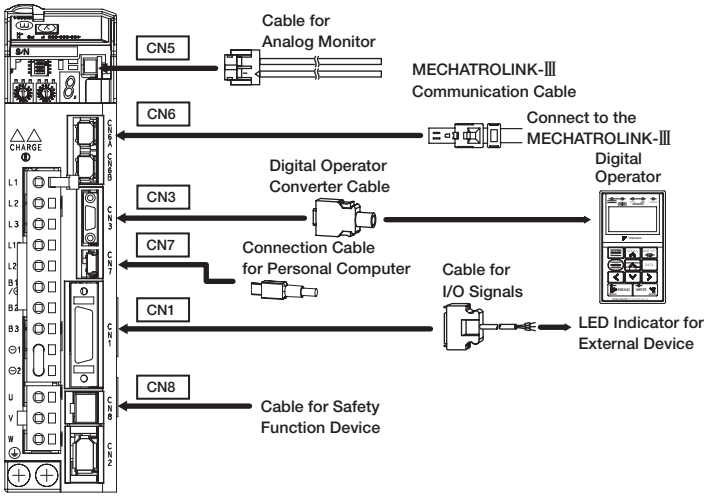
Main Circuit Power Supply	Applicable Servomotor Max. Capacity kW	SERVOPACK Model SGDV-	Power Supply Capacity kVA	Output Current Arms	Main Circuit Power Loss W	Regenerative Resistor Power Loss W	Control Circuit Power Loss W	Total Power Loss W
Single-phase 200 V	0.05	R70A	0.2	0.66	5.2	—	17	22.2
	0.1	R90A	0.3	0.91	7.4			24.4
	0.2	1R6A	0.7	1.6	13.7			30.7
	0.4	2R8A	1.2	2.8	24.9			41.9
	0.75	5R5A	1.9	5.5	52.7	8		77.7
	1.5	120A	4	11.6	68.2	10	22	100.2
Three-phase 200 V	0.05	R70A	0.2	0.66	5.1	—	17	22.1
	0.1	R90A	0.3	0.91	7.3			24.3
	0.2	1R6A	0.6	1.6	13.5			30.5
	0.4	2R8A	1	2.8	24.0			41.0
	0.5	3R8A	1.4	3.8	20.1	8		45.1
	0.75	5R5A	1.6	5.5	43.8			68.8
	1.0	7R6A	2.3	7.6	53.6			78.6
	1.5	120A	3.2	11.6	65.8	10	22	97.8
	2.0	180A	4	18.5	111.9	16		149.9
	3.0	200A	5.9	19.6	113.8			161.4
	5.0	330A	7.5	32.9	263.7	36	27	326.7
	6.0	470A	10.7	46.9	279.4	(180)*1	33	312.4
	7.5	550A	14.6	54.7	357.8	(350)*2		390.8
	11	590A	21.7	58.6	431.7		48	479.7
	15	780A	29.6	78	599.0			647.0
Three-phase 400 V	0.5	1R9D	1.1	1.9	24.6	14	21	59.6
	1.0	3R5D	2.3	3.5	46.1			81.1
	1.5	5R4D	3.5	5.4	71.3			106.3
	2.0	8R4D	4.5	8.4	77.9	28	25	130.9
	3.0	120D	7.1	11.9	108.7			161.7
	5.0	170D	11.7	16.5	161.1	36	24	221.1
	6.0	210D	12.4	20.8	172.7	180 *3	27	199.7
	7.5	260D	14.4	25.7	218.6			245.6
	11	280D	21.9	28.1	294.6	350 *4	30	324.6
	15	370D	30.6	37.2	403.8			433.8

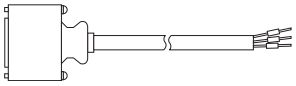
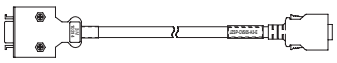
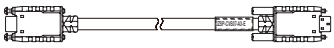
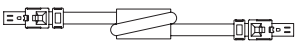
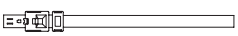
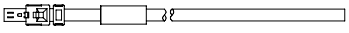
*1: For the optional JUSP-RA04-E regenerative resistor unit.
*2: For the optional JUSP-RA05-E regenerative resistor unit.
*3: For the optional JUSP-RA18-E regenerative resistor unit
*4: For the optional JUSP-RA19-E regenerative resistor unit.

Notes: 1 SGDV-R70A, -R90A, -1R6A, and -2R8A SERVOPACKs do not have built-in regenerative resistors.
If the regenerative energy exceeds the specified value, connect an external regenerative resistor (optional).
2 SGDV-470A, -550A, -590A, -780A, -210D, -260D, -280D, -370D SERVOPACKs do not have built-in regenerative resistors.
Be sure to connect a regenerative resistor unit (optional) or an external regenerative resistor (optional). For selection details, refer to page 364.
3 Regenerative resistor power losses are allowable losses. Take the following action if this value is exceeded.
- Remove the lead or short bar that is short-circuiting the SERVOPACK main circuit terminal B2 and B3.
(SGDV-3R8A, -5R5A, -7R6A, -120A, -180A, -200A, -330A, or 400-V class SERVOPACKs.)
- Install an external regenerative resistor (optional). For selection details, refer to page 364.

Selecting Cables

● Cables for CN1 CN3 CN5 CN6 CN7 CN8 (MECHATROLINK-Ⅲ Communications Reference Type SERVOPACKs)



Name		Length	Order No.	Specifications	Details
CN1 Cables for I/O Signals	Connector Kit		JZSP-CSI9-2-E	Soldered 	(1)
	Connector Terminal Converter Unit	0.5 m	JUSP-TA26P-E	Terminal Block and Connection Cable 	(2)
		1 m	JUSP-TA26P-1-E		
		2 m	JUSP-TA26P-2-E		
	Cable with Loose wire at One End	1 m	JZSP-CSI02-1-E		(3)
		2 m	JZSP-CSI02-2-E		
		3 m	JZSP-CSI02-3-E		
CN3	Digital Operator		JUSP-OP05A-1-E	With Connection Cable (1 m) 	(4)
	Digital Operator Converter Cable	0.3 m	JZSP-CVS05-A3-E	Cable with Connectors at Both Ends 	(5)
			JZSP-CVS07-A3-E	With Lock Screws 	(6)
CN7 Connection Cables for Personal Computer		2.5 m	JZSP-CVS06-02-E	Cable with Connectors at Both Ends 	(7)
CN6A CN6B MECHATROLINK-Ⅲ Communication Cable	Cables with Connectors at Both Ends	0.2 to 50 m	JEPMC- 6012-□□-		(8)
	Cables with Connectors at Both Ends (With Ferrite Core)	10 to 50 m	JEPMC-W6013-□□-E		(9)
	Cable with Loose Wire at One End	0.5 to 50 m	JEPMC-W6014-□□-E		(10)
CN5 Cables for Analog Monitor		1 m	JZSP-CA01-E	SERVOPACK End 	(11)
CN8 Cable for Safety Function Device	Cables with Connector	3 m	JZSP-CVH03-03-E JZSP-CVH03-03-E-G3		(12)
	Connector kit		Contact Tyco Electronics AMP K.K. Product name : Industrial Mini I/O D-shape Type1 Plug Connector Kit Model : 2013595-1		

*1 : A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-Ⅴ series SERVOPACKs.
*2 : A converter cable with lock screws is required to securely connect the digital operator cable.
*3 : When using the safety function, connect this cable to the safety devices.
Even when not using the safety function, use SERVOPACKs with the Safe Jumper Connector (model: JZSP-CVH05-E) connected.
*4 : Use the connector kit when you make cables yourself.

Selecting Cables

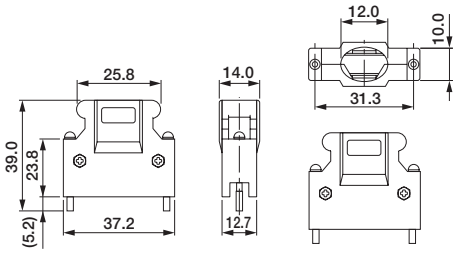
(1) Connector Kit for CN1

Use the following connector and cable to assemble the cable. The CN1 connector kit includes one case and one connector.

Connector Kit Model	Case		Connector	
	Model	Qty	Model	Qty
JZSP-CSI9-2-E	10326-52A0-008*	1 set	10126-3000PE* (Soldered)	1

* : Manufactured by Sumitomo 3M Ltd.

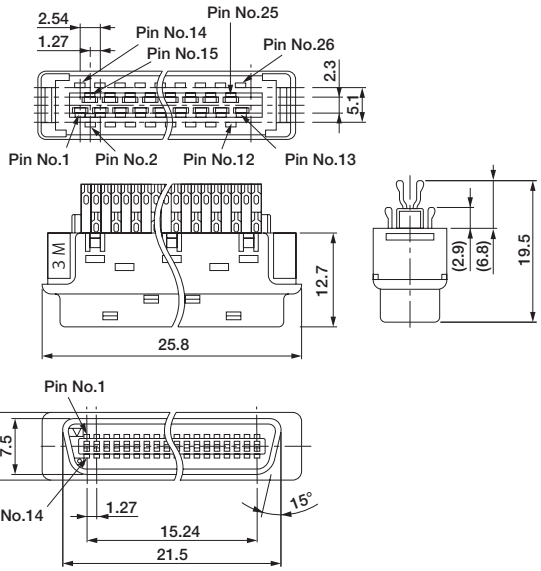
• External Dimensions of Case (Units: mm)



• Cable Size

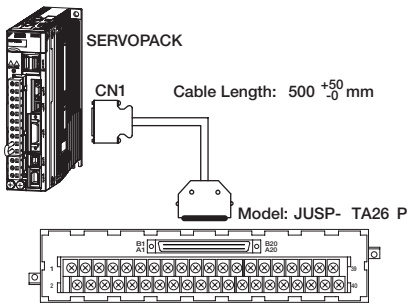
Item	Specifications
Cable	Use twisted-pair or twisted-pair shielded wire.
Applicable Wires	AWG24, 26, 28, 30
Cable Finished Diameter	16 dia. max.

• External Dimensions of Connector (Units: mm)

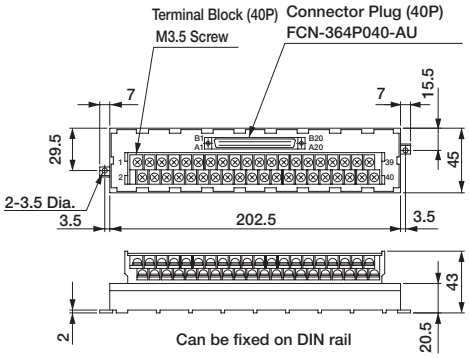


(2) Connector Terminal Converter Unit for CN1

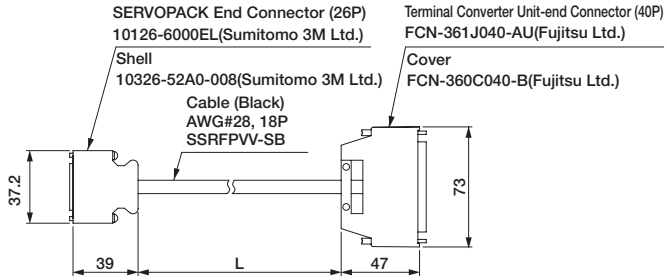
• Configurations



• External Dimensions of Terminal Block (Units: mm)



• Dimensional Drawings of Cable

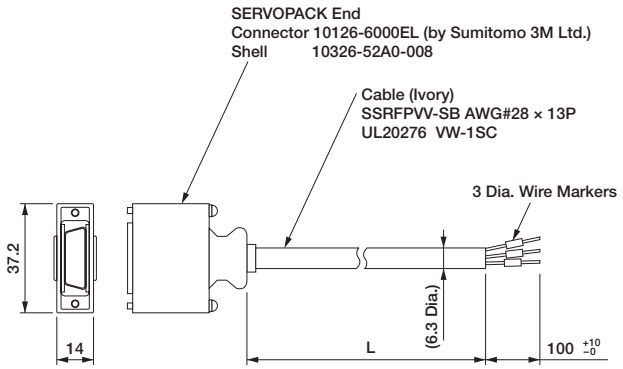


Model	Cable Length (L)	Approx. Mass
JUSP-TA26P-E	0.5 m	100 g
JUSP-TA26P-1-E	1 m	200 g
JUSP-TA26P-2-E	2 m	400 g

Note: The pin number in the SERVOPACK connector and the pin number in the terminal block are the same. Pin numbers 1 to 26 are used in the terminal block. Do not use a pin number of 27 or higher.
If assembling cables, refer to ●*Cable with Loose Wires at One End for CN1 Connection Diagram of JZSP-CSI02-□-E Cable* on the next page.

Selecting Cables

(3) Cable with Loose Wires at One End for CN1
External Dimensions of Cable (Units: mm)



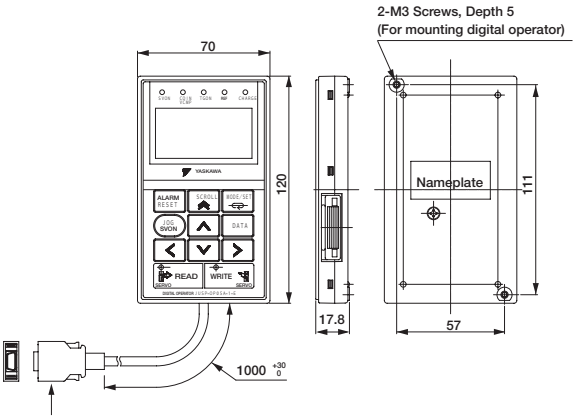
Model	Cable Length
JZSP-CSI02-1-E	1 m
JZSP-CSI02-2-E	2 m
JZSP-CSI02-3-E	3 m

● Cable with Loose Wires at One End for CN1
Connection Diagram of JZSP-CSI02-□-E Cable

SERVOPACK End					Host Controller End
Pin No.	Signal	Wire Color	Marking		Lead Marker
			Color	Dots	
1	/SO1+	Blue	Red	1	1
2	/SO1–	Blue	Black	1	2
3	ALM+	Pink	Red	1	3
4	ALM–	Pink	Black	1	4
5	5	Green	Red	1	5
6	+24VIN	Green	Black	1	6
7	P-OT	Orange	Red	1	7
8	N-OT	Orange	Black	1	8
9	/DEC	Gray	Red	1	9
10	/EXT1	Gray	Black	1	10
11	/EXT2	Blue	Red	2	11
12	/EXT3	Blue	Black	2	12
13	/S10	Pink	Red	2	13
14	BAT (+)	Green	Red	2	14
15	BAT (–)	Green	Black	2	15
16	SG	Pink	Black	2	16
17	PAO	Orange	Red	2	17
18	/PAO	Orange	Black	2	18
19	PBO	Gray	Red	2	19
20	/PBO	Gray	Black	2	20
21	PCO	Blue	Red	3	21
22	/PCO	Blue	Black	3	22
23	/SO2+	Pink	Red	3	23
24	/SO2–	Pink	Black	3	24
25	/SO3+	Green	Red	3	25
26	/SO3–	Green	Black	3	26

: Represents twisted-pair wires.

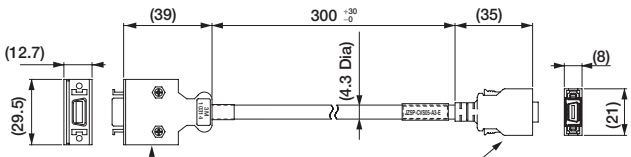
(4) Digital Operator (Model: JUSP-OP05A-1-E)
(Units: mm)



Connector: HDR-E14MAG1+(Honda Tsushin Kogyo Co., Ltd.)
Case: HDR-E14LPA5(Honda Tsushin Kogyo Co., Ltd.)

(5) Digital Operator Converter Cable for CN3
(Model: JZSP-CVS05-A3-E)
A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-Ⅴ series SERVOPACKs.

● External Dimensions (Units: mm)

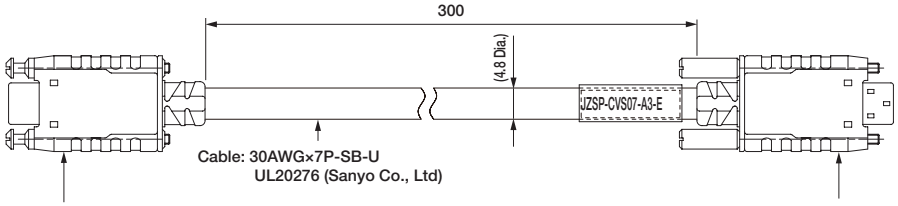


Connector (14-pole): 10214-6202PL
(Sumitomo 3M Ltd.)
Cover: FA458036
(Yasco Components Co., Ltd.)

Connector (14-pole): HDR-E14MAG1+
(Honda Tsushin Kogyo Co., Ltd.)
Cover: HDR-E14LPA5
(Honda Tsushin Kogyo Co., Ltd.)

(6) Digital Operator Converter Cable for CN3
(Model: JZSP-CVS07-A3-E)
A converter cable is required when connecting the digital operator cable while using MECHATROLINK–Ⅲ Communications SERVOPACK.

● External Dimensions (Units: mm)



Cable: 30AWG×7P-SB-U
UL20276 (Sanyo Co., Ltd)

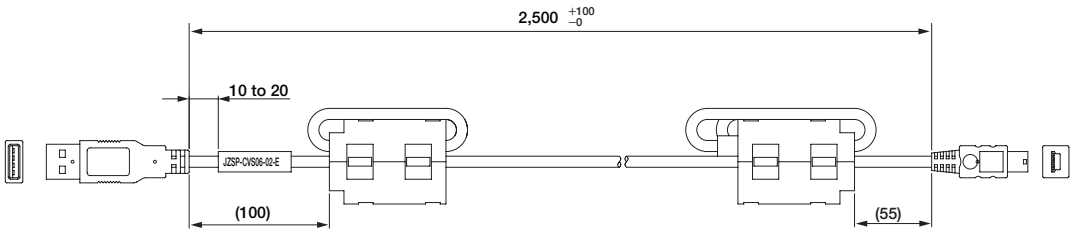
Connector: HDR-E14FAG1+ (Honda Tsushin Kogyo Co., Ltd.)
Cover: HDR-E14LPHD+ (Honda Tsushin Kogyo Co., Ltd.)

Connector: HDR-E14MAG1+ (Honda Tsushin Kogyo Co., Ltd.)
Cover: HDR-E14LPH (Honda Tsushin Kogyo Co., Ltd.)

Selecting Cables

(7) Connection Cable for Personal Computer for CN7 (Model: JZSP-CVS06-02-E)

• External Dimensions (Units: mm)

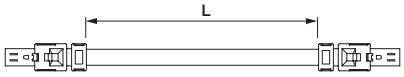


IMPORTANT Use a cable specified by Yaskawa.
When using other cables, operation cannot be guaranteed.

(8) MECHATROLINK-Ⅲ Communications Cable for CN6 (Model: JEPMC-W6012--E)

● External Dimensions (Units: mm)

Cables with Connectors at Both Ends

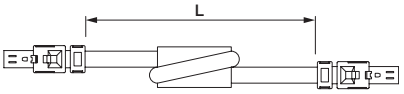


Model	Cable Length (L)
JEPMC-W6012-A2-E	0.2 m
JEPMC-W6012-A5-E	0.5 m
JEPMC-W6012-01-E	1 m
JEPMC-W6012-02-E	2 m
JEPMC-W6012-03-E	3 m
JEPMC-W6012-04-E	4 m
JEPMC-W6012-05-E	5 m
JEPMC-W6012-10-E	10 m
JEPMC-W6012-20-E	20 m
JEPMC-W6012-30-E	30 m
JEPMC-W6012-50-E	50 m

(9) MECHATROLINK-Ⅲ Communications Cable for CN6 (Model: JEPMC-W6013--E)

● External Dimensions (Units: mm)

Cables with Connectors at Both Ends (With Ferrite Core)

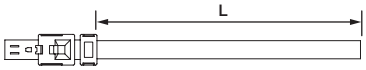


Model	Cable Length (L)
JEPMC-W6013-10-E	10 m
JEPMC-W6013-20-E	20 m
JEPMC-W6013-30-E	30 m
JEPMC-W6013-50-E	50 m
JEPMC-W6013-75-E	75 m

(10) MECHATROLINK-Ⅲ Communications Cable for CN6 (Model: JEPMC-W6014-□□-E)

● External Dimensions (Units: mm)

Cable with Loose Wire at One End



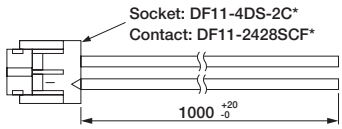
Model	Cable Length (L)
JEPMC-W6014-A5-E	0.5 m
JEPMC-W6014-01-E	1 m
JEPMC-W6014-03-E	3 m
JEPMC-W6014-05-E	5 m
JEPMC-W6014-10-E	10 m
JEPMC-W6014-30-E	30 m
JEPMC-W6014-50-E	50 m

IMPORTANT Use a MECHATROLINK-Ⅲ communications cable specified by Yaskawa. When using other cables, noise resistance may be reduced, and operation cannot be guaranteed.

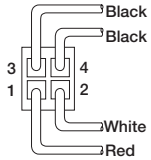
Selecting Cables

(11) Cable for Analog Monitor for CN5 (Model: JZSP-CA01-E)

● External Dimensions (Units: mm)



* : Manufactured by Hirose Electric Corporation.



View from Cable End

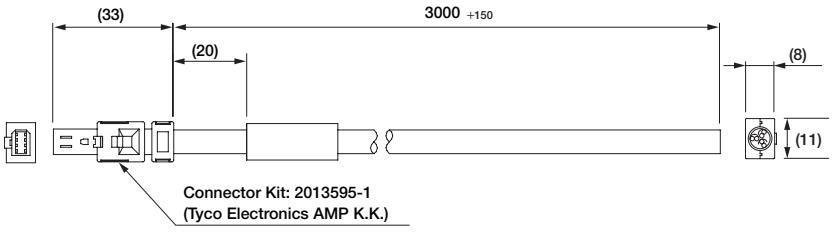
• Specifications

Pin No.	Cable Color	Signal	Standard Settings
1	Red	Analog Monitor 2	Motor speed : 1V/1000 min-1
2	White	Analog Monitor 1	Torque reference : 1V/100% rated torque
3, 4	Black (2 cables)	GND(0V)	–

Note : The specifications above are factory settings. Monitor specifications can be changed by changing parameters Pn006 and Pn007.

(12) Cable with Connector for CN8 (Model: JZSP-CVH03-03-E)

● External Dimensions (Units: mm)

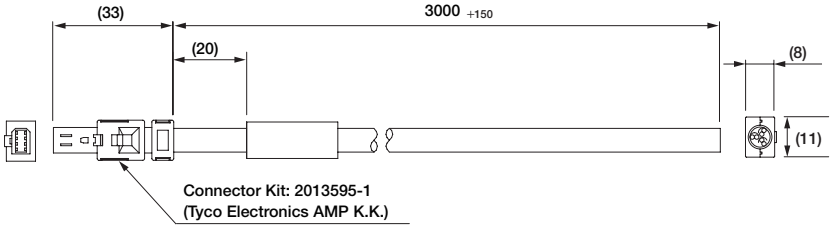


• Specifications

Pin No.	Signal	Lead Color	Marking Color
1	Not used	–	–
2	Not used	–	–
3	/HWBB1–	White	Black
4	/HWBB1+	White	Red
5	/HWBB2–	Gray	Black
6	/HWBB2+	Gray	Red
7	EDM1–	Orange	Black
8	EDM1+	Orange	Red

(Model: JZSP-CVH03-03-E-G3)

● External Dimensions (Units: mm)



• Specifications

Pin No.	Signal	Lead Color	Marking Color
1	Not used	–	–
2	Not used	–	–
3	/HWBB1–	White	–
4	/HWBB1+	Brown	–
5	/HWBB2–	Green	–
6	/HWBB2+	Yellow	–
7	EDM1–	Grey	–
8	EDM1+	Pink	–

SERVOPACKs with Additional Options

SGDV-□□□□E1
(For Rotary Servomotors)

SGDV-□□□□E5
(For Linear Servomotors)

Model Designations

SGDV- R70 A E1 A 000 00 0

Σ-V Series SGDV SERVOPACK

Current

Voltage	Code	Applicable Servomotor Max. Capacity kW
200 V	R70*1	0.05
	R90*1	0.1
	1R6*1	0.2
	2R8*1	0.4
	3R8	0.5
	5R5*1	0.75
	7R6	1.0
	120*2	1.5
	180	2.0
	200	3.0
	330	5.0
	470	6.0
	550	7.5
	590	11
	780	15
400 V	1R9	0.5
	3R5	1.0
	5R4	1.5
	8R4	2.0
	120	3.0
	170	5.0
	210	6.0
	260	7.5
	280	11
	370	15

Voltage

Code	Specifications
A	200 VAC
D	400 VAC

Interface

Code	Specifications
E1	Command Option Attachable Type (for rotary servomotors)
E5	Command Option Attachable Type (for linear servomotors)

Design Revision Order A, B...

Options (hardware)

Code	Specifications
000	Base-mounted (standard)
001	Rack-mounted
002	Varnished
003	Rack-mounted and Varnished
008	Single-phase 200 VAC input (model: SGDV120AE1A00800020□)
020	Dynamic brake (DB)*3

Options (software)

Options (parameter)

*1 These amplifiers can be powered with single or three-phase.

*2 SGDV-120A□□A008000□□□, a special version of the 1.5 kW amplifier can be used for single-phase operation.

*3 : The specifications differ in accordance with the power supply voltage of the SERVOPACK to be used.
- For 100-V and 200-V SERVOPACKs : The DB function will be disabled when the SERVOPACK stops or the power supply is turned OFF.
- For 400-V SERVOPACK : The DB resistor can be mounted onto the outside of the SERVOPACK. If the DB resistor is not mounted, the DB function will be enabled.

Features

- Unprecedented ease-of-use through cutting-edge technology
  New tuning-less function means no adjustment needed.
  Impressive load regulation with strengthened vibration suppression function.
- Slashed setup time
  Setup wizard function and wiring conformation function of engineering tool SigmaWin+ allows easy setup just by watching the monitor.
- High response characteristics at 1 kHz min.
  New advanced autotuning.
  Reduced positioning time through model following control, and smooth machine control enabled by vibration suppression function.
- Connectivity to INDEXER Option Module for single-axis positioning, EtherCAT (CoE) Network Option Module, CANopen Network Module, Powerlink Network Module and MP2600iec Single Axis Controller Option Module.

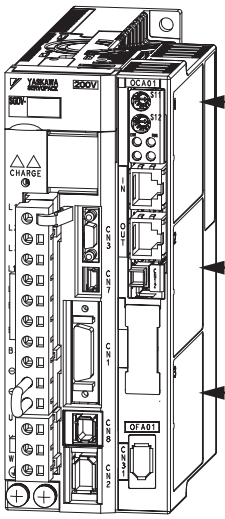
Product Labeling

The three digit option module code allows for expandability of the servo amplifier's functionality. Each digit of the code defines a different type of option

- First Digit (Control Architecture): compatible with various communication interfaces or single-axis control architectures.
- Second Digit (Safety): compatible with EN60204-1 stop category 1 and 2 (stop category 0 is standard)
- Third Digit (Feedback): compatible with fully-closed loop control

NOTE: Amplifiers with Interface Option E1 and E5 can accommodate option modules that utilize all 3 digits of the Option Module Code.

Combination Example:



Nameplate for SERVOPACK
Model : SGDV-□□□□E□A
(Refer to Model Designations provided in the SERVOPACK pages for details)

Nameplate for
INDEXER Option Module **Model : SGDV-OCA03A**
EtherCAT (CoE) Network Module **Model : SGDV-OCA01A**
CANopen Network Module **Model : SGDV-OCB01A**
POWERLINK Network Module **Model : SGDV-OCB02A**

Nameplate for Safety Option Module (SS1, SS2, SLS and STO)
Model : SGDV-OSA01A

Nameplate for Option Module for Fully-closed Loop Control
Model : SGDV-OFA01A

NOTE: Mounting of Option Modules on Amplifiers with Interface Option E1 and E5 requires mounting kit SGDV-OZA01A (metal bar, mounting screws and cover).

SGDV-□□□□E1/E5

Ratings

Single-phase 200 V

SERVOPACK Model SGDV□□□□		R70A	R90A	1R6A	2R8A	5R5A	120A*1
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4	0.75	1.5
Continuous Output Current	A_{rms}	0.66	0.91	1.6	2.8	5.5	11.6
Max. Output Current	A_{rms}	2.1	2.9	5.8	9.3	16.9	28
Regenerative Resistor		None/External				Built-in/External	
Main Circuit (Single Phase)		220 to 230 VAC +10% to -15% 50/60 Hz					
Control Circuit (Single Phase)		220 to 230 VAC +10% to -15% 50/60 Hz					

*1: Single-phase 200 VAC SERVOPACKs are also available (base-mounted SERVOPACK model: SGDV-120A□□A008000, rack-mounted SERVOPACK model: SGDV-120A□□A009000).

Three-phase 200 V

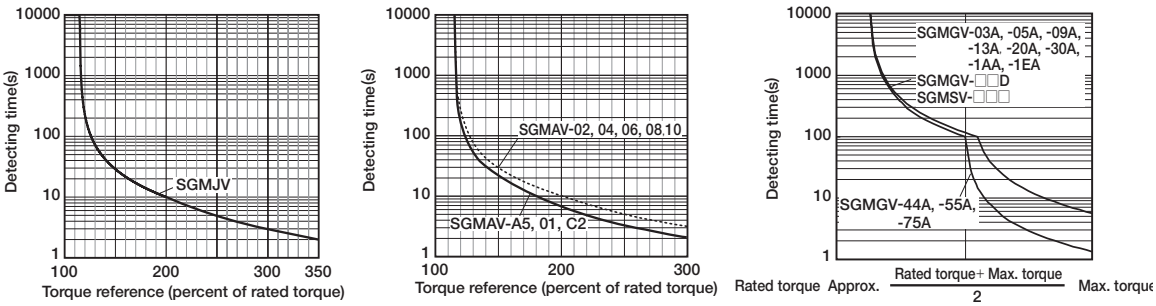
SERVOPACK Model SGDV□□□□		R70A	R90A	1R6A	2R8A	3R8A	5R5A	7R6A	120A	180A	200A	330A	470A	550A	590A	780A
Applicable Servomotor Max. Capacity	kW	0.05	0.1	0.2	0.4	0.5	0.75	1.0	1.5	2.0	3.0	5.0	6	7.5	11	15
Continuous Output Current	A_{rms}	0.66	0.91	1.6	2.8	3.8	5.5	7.6	11.6	18.5	19.6	32.9	46.9	54.7	58.6	78
Max. Output Current	A_{rms}	2.1	2.9	5.8	9.3	11	16.9	17	28	42	56	84	110	130	140	170
Regenerative Resistor		None/External				Built-in/External							External			
Main Circuit (Three-phase 200 VAC)		Three-phase 200 to 200 VAC +10% to -15% 50/60 Hz														
Control Circuit (Three-phase 200 VAC)		Single-phase 200 to 200 VAC +10% to -15% 50/60 Hz														

Three-phase 400 V

SERVOPACK Model SGDV□□□□		1R9D	3R5D	5R4D	8R4D	120D	170D	210D	260D	280D	370D
Applicable Servomotor Max. Capacity	kW	0.5	1.0	1.5	2.0	3.0	5.0	6	7.5	11	15
Continuous Output Current	A_{rms}	1.9	3.5	5.4	8.4	11.9	16.5	20.8	25.4	28.1	37.2
Max. Output Current	A_{rms}	5.5	8.5	14	20	28	42	55	65	70	85
Regenerative Resistor		Built-in/External						External			
Main Circuit (Three-phase 400 VAC)		Three-phase 380 to 480 VAC +10% to -15% 50/60 Hz									
Control Circuit (24 VDC)		24 VDC ±15%									

Note: The entire over voltage category is Ⅲ.

● SERVOPACK Overload Characteristics



Note: Overload characteristics shown above do not guarantee continuous duty of 100% or more output. Use a servomotor with effective torque within the continuous duty zone of *Torque-Speed Characteristics.*

Specifications

Items		Specifications
Control Method		IGBT PWM control, sine-wave driven
Feedback	Rotary Servomotors	Serial encoder: 13-bit (incremental encoder) : 20-bit (incremental/absolute encoder)
	Linear Servomotors	Absolute linear scale (The signal resolution varies depending on the absolute linear scale.) Incremental linear scale (The signal resolution varies depending on the incremental linear scale or serial converter unit.)
Operating Conditions	Surrounding/Storage Temperature	Surrounding temperature: 0 to +55℃, storage temperature: -20 to +85℃
	Ambient/Storage Humidity	90% RH or less (no freezing or condensation)
	Vibration/Shock Resistance	Vibration resistance: 4.9 m/s², Shock resistance: 19.6 m/s²
	Protection class/Pollution degree	Protection class: IP 10, pollution degree: 2 Do not use SERVOPACKs in the following locations: ·Locations subject to corrosive or flammable gases ·Locations subject to exposure to water, oil, or chemicals ·Locations subject to dust, including iron dust, and salts
	Others	Do not use SERVOPACKs in the following locations: ·Locations subject to static electricity noise, strong electromagnetic/magnetic fields, radioactivity
	Altitude	1000 m or less

Specifications

Items			Specifications	
Compliant Standards			UL508C EN50178, EN55011/A2 group 1 class A, EN61000-6-2, EN61800-3, EN61800-5-1, EN954-1, IEC61508-1 to 4	
Configuration			Standard: Base-mounted; Optional: Rack-mounted, Duct-ventilated	
Performance	Speed Control Range		1:5000 (The lowest speed of the speed control range is the speed at which the servomotor will not stop with a rated torque load.)	
	Speed Regulation*1	Load Fluctuation	0% to 100% load: ±0.01% max. (at rated speed)	
		Voltage Fluctuation	Rated voltage: ±10% : 0% (at rated speed)	
		Temperature Fluctuation	25±25°C : ±0.1% max. (at rated speed)	
	Torque Control Tolerance (Repeatability)		±1%	
I/O Signals	Encoder Output Pulses		Phase A, phase B, phase C: line driver output The number of dividing pulse: Any setting ratio is available.	
	Sequence Input	Input Signals which can be allocated	No. of Channels	7 channels
			Functions	· Forward run prohibited (P-OT), · Forward external torque limit (/P-CL), Reverse run prohibited (N-OT) · reverse external torque limit (/N-CL) · General-purpose input signal (/SI0 to /SI6)*2 Signal allocations can be performed, and positive and negative logic can be changed.
	Sequence Output	Fixed Output	Servo alarm (ALM)	
		Output Signals which can be allocated	No. of Channels	3 channels
			Functions	· Positioning completion (/COIN) · Speed limit detection (/VLT) · Speed coincidence detection (/V-CMP) · Brake (/BK) · Servomotor rotation detection (/TGON) · Warning (/WRAN) · Servo ready (/S-RDY) · Near (/NEAR) · Torque limit detection (/CLT) Signal allocations can be performed, and positive and negative logic can be changed.
Communications	RS-422A Communications	Interface	Digital operator (JUSP-OP05A-1-E), personal computer (can be connected with SigmaWin+)	
		1:N communications	RS-422A port: N=15 max. available	
		Axis address setting	Set by parameters	
	USB Communications	Interface	Personal computers (can be connected with SigmaWin+)	
		Communications Standard	Compliant with USB 1.1 standard (12 Mbps)	
Display			CHARGE and POWER (seven-segment display)	
Analog Monitor			Number of points: 2 Output voltage: ±10 VDC (linearity effective range ±8 V) Resolution: 16 bit Accuracy: ±20 mV (Typ) Max. output current: ±10 mA Settling time (±1%): 1.2 ms (Typ)	
Dynamic Brake (DB)			Activated when the power supply for the main circuit or the SERVOPACK is OFF, when overtravel (OT) or a servo alarm occurs, or during a hardwired base block.	
Regenerative Processing			200 VAC SGDV-R70A, -R90A, -1R6A, -2R8A: External regenerative resistor (optional) 200 VAC SGDV-470A, -550A, -590A, -780A: External regenerative resistor unit (optional) 200 VAC models other than shown above: Built-in regenerative resistor 400 VAC SGDV-210D, -260D, -280D, -370D: External regenerative resistor unit (optional) 400 VAC models other than shown above: Built-in regenerative resistor	
Overtravel (OT) Prevention			Dynamic brake stop at P-OT or N-OT, deceleration to a stop, or free run to a stop	
Protective Functions			Overcurrent, Overvoltage, low voltage, overload, regeneration error	
Utility Functions			Gain adjustment, alarm history, JOG operation, origin search, etc.	
Safety Functions		Input	/HWBB1, /HWBB2: Baseblock signal for power module	
		Output	EDM1: Status monitor (fixed output) of built-in safety circuit	
Option Modules			Fully-closed option module, EtherCAT (CoE), INDEXER module, CANopen Network Module, Powerlink Option Module, MP2600iec 1.5 axis controller	

*1: Speed regulation is defined as follows:

$$\text{Speed regulation} = \frac{\text{No-load motor speed} - \text{Total load motor speed}}{\text{Rated motor speed}} \times 100\%$$

The motor speed may change due to voltage variations or temperature variation. The ratio of speed changes to the rated speed represent speed regulation due to voltage and temperature fluctuations.

*2: For details on the functions of the general-purpose input signals /SI0 to /SI6, refer to the manual of the Command Option Module being used.

Power Supply Capacities and Power Losses

The following table shows SERVOPACK's power supply capacities and power losses at the rated output.

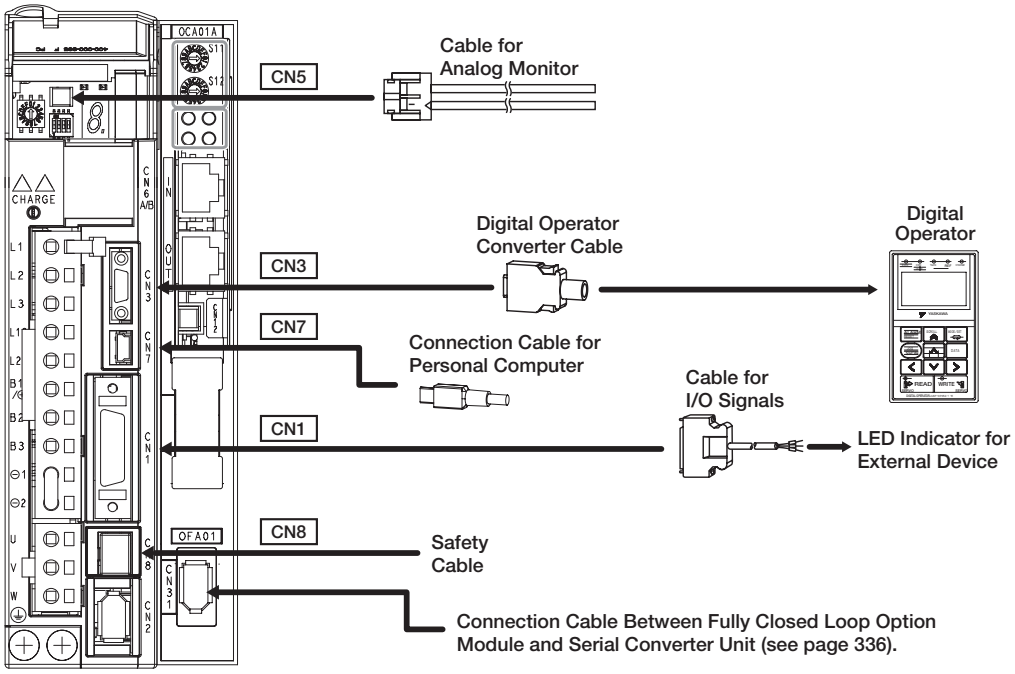
Main Circuit Power Supply	Applicable Servomotor Max. Capacity kW	SERVOPACK Model SGDV	Power Supply Capacity kVA	Output Current A	Main Circuit Power Loss W	Regenerative Resistor Power Loss W	Control Circuit Power Loss W	Total Power Loss W
Single-phase 200 V	0.05	R70A	0.2	0.66	5.2	—	17	22.2
	0.1	R90A	0.3	0.91	7.4			24.4
	0.2	1R6A	0.7	1.6	13.7			30.7
	0.4	2R8A	1.2	2.8	24.9			41.9
	0.75	5R5A	1.9	5.5	52.7	8		77.7
	1.5	120A	4	11.6	68.2	10	22	100.2
Three-phase 200 V	0.05	R70A	0.2	0.66	5.1	—	17	22.1
	0.1	R90A	0.3	0.91	7.3			24.3
	0.2	1R6A	0.6	1.6	13.5			30.5
	0.4	2R8A	1	2.8	24.0			41.0
	0.5	3R8A	1.4	3.8	20.1	8		45.1
	0.75	5R5A	1.6	5.5	43.8			68.8
	1.0	7R6A	2.3	7.6	53.6			78.6
	1.5	120A	3.2	11.6	65.8	10	22	97.8
	2.0	180A	4	18.5	111.9	16		149.9
	3.0	200A	5.9	19.6	113.8			161.4
	5.0	330A	7.5	32.9	263.7	36	27	326.7
	6.0	470A	10.7	46.9	279.4	(180)*1	33	312.4
	7.5	550A	14.6	54.7	357.8	(350)*2		390.8
	11	590A	21.7	58.6	431.7		48	479.7
	15	780A	29.6	78	599.0			647.0
Three-phase 400 V	0.5	1R9D	1.1	1.9	24.6	14	21	59.6
	1.0	3R5D	2.3	3.5	46.1			81.1
	1.5	5R4D	3.5	5.4	71.3			106.3
	2.0	8R4D	4.5	8.4	77.9	28	25	130.9
	3.0	120D	7.1	11.9	108.7			161.7
	5.0	170D	11.7	16.5	161.1	36	24	221.1
	6.0	210D	12.4	20.8	172.7	(180)*3	27	199.7
	7.5	260D	14.4	25.7	218.6			245.6
	11	280D	21.9	28.1	294.6	(350)*4	30	324.6
	15	370D	30.6	37.2	403.8			433.8

*1: For the optional JUSP-RA04-E regenerative resistor unit.
*2: For the optional JUSP-RA05-E regenerative resistor unit.
*3: For the optional JUSP-RA18-E regenerative resistor unit.
*4: For the optional JUSP-RA19-E regenerative resistor unit.

Notes: 1 SGDVR70A, R90A, 1R6A, and 2R8A SERVOPACKs do not have built-in regenerative resistors.
If the regenerative energy exceeds the specified value, connect an external regenerative resistor (optional).
2 SGDV470A, 550A, 590A, 780A, 210D, 260D, 280D, 370D SERVOPACKs do not have built-in regenerative resistors.
Be sure to connect a regenerative resistor unit (optional) or an external regenerative resistor (optional). For selection details, refer to page 364.
3 Regenerative resistor power losses are allowable losses. Take the following action if this value is exceeded.
· Remove the lead or short bar that is short-circuiting the SERVOPACK main circuit terminal B2 and B3.
(SGDV3R8A, 5R5A, 7R6A, 120A, 180A, 200A, 330A, or 400 V class SERVOPACKs.)
· Install an external regenerative resistor (optional). For selection details, refer to page 364.

Selecting Cables

● Cables for CN1 CN3 CN5 CN7 CN8 CN11 for Option Module Type SERVOPACKs



Name		Length	Order No.	Specifications	Details
CN1 Cables for I/O Signals	Connector Kit		JZSP-CSI9-2-E	Soldered	(1)
	Connector Terminal Converter Unit		JUSP-TA26P-E	Terminal Block and 0.5 m Connection Cable	(2)
	Cable with Loose wire at One End	1 m	JZSP-CSI02-1-E		(3)
		2 m	JZSP-CSI02-2-E		
		3 m	JZSP-CSI02-3-E		
CN3	Digital Operator		JUSP-OP05A-1-E	With Connection Cable (1 m)	(4)
	Digital Operator Converter Cable*1	0.3 m	JZSP-CVS05-A3-E	Cable with Connectors at Both Ends	(5)
CN7 Connection Cables for Personal Computer		2.5 m	JZSP-CVS06-02-E	Cable with Connectors at Both Ends	(6)
CN5 Cables for Analog Monitor		1 m	JZSP-CA01-E	SERVOPACK End	(7)
CN8 Cables for Safety Functions	Cables with Connector*2	3 m	JZSP-CVH03-03-E JZSP-CVH03-03-E-G3		(8)
	Connector kit*3		Contact Tyco Electronics AMP K.K. Product name : Industrial Mini I/O D-shape Type1 Plug Connector Kit Model : 2013595-1		

*1 : A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-Ⅴ series SERVOPACKs.
*2 : When using the safety function, connect this cable to the safety devices.
Even when not using the safety function, use SERVOPACKs with the Safe Jumper Connector (model: JZSP-CVH05-E) connected.
*3 : Use the connector kit when you make cables yourself.

Selecting Cables

(1) Connector Kit for CN1

Use the following connector and cable to assemble the cable. The CN1 connector kit includes one case and one connector.

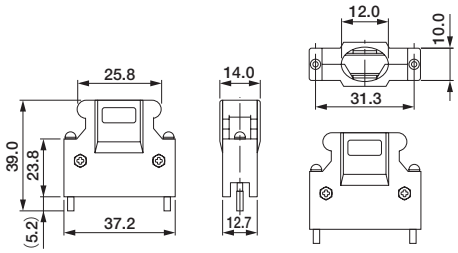
Connector Kit Model	Case		Connector	
	Model	Qty	Model	Qty
JZSP-CSI9-2-E	10326-52A0-008*	1 set	10126-3000PE* (Soldered)	1

* : Manufactured by Sumitomo 3M Ltd.

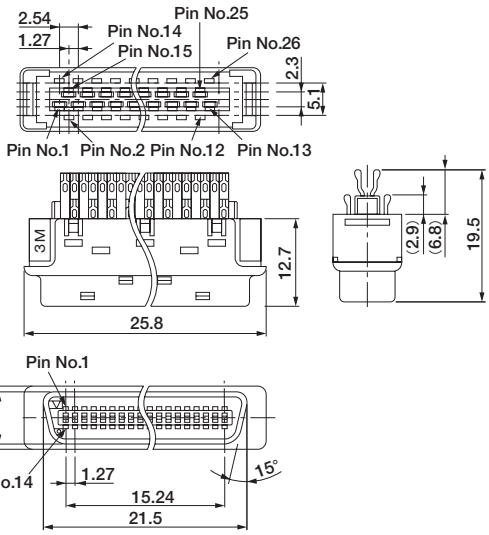
· Cable Size

Item	Specifications
Cable	Use twisted-pair or twisted-pair shielded wire.
Applicable Wires	AWG24, 26, 28, 30
Cable Finished Diameter	16 dia. max.

· External Dimensions of Case (Units: mm)

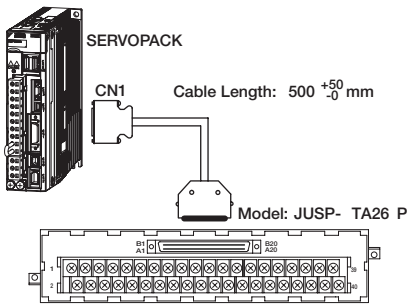


· External Dimensions of Connector (Units: mm)

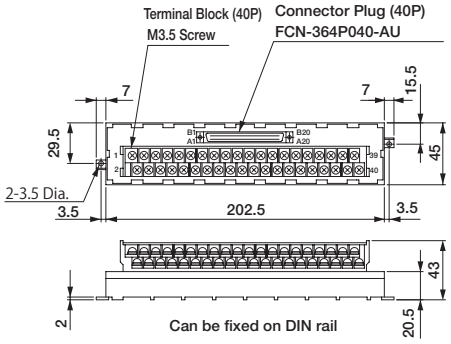


(2) Connector Terminal Converter Unit for CN1

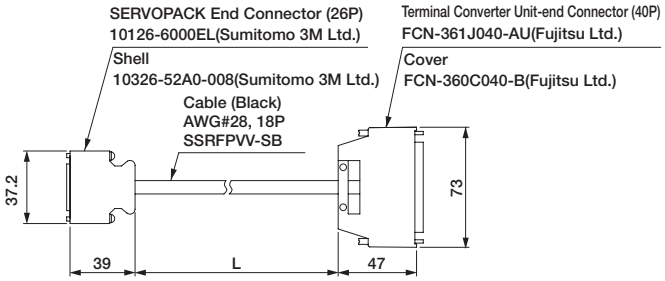
· Configurations



· External Dimensions of Terminal Block (Units: mm)



· External Dimensions of Cable (Units: mm)



Model	Cable Length (L)	Approx. Mass
JUSP-TA26P-E	0.5 m	100 g
JUSP-TA26P-1-E	1 m	200 g
JUSP-TA26P-2-E	2 m	400 g

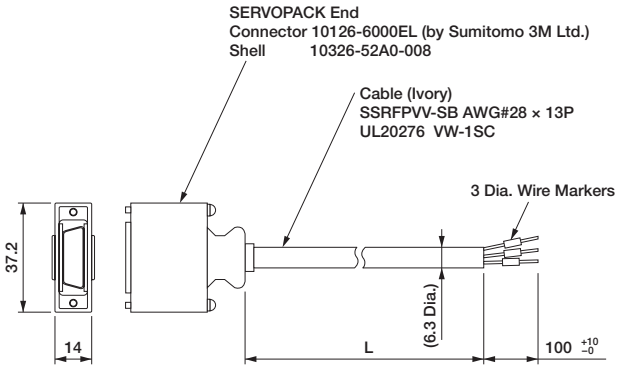
Note: The pin number in the SERVOPACK connector and the pin number in the terminal block are the same. Pin numbers 1 to 26 are used in the terminal block. Do not use a pin number of 27 or higher.
If assembling cables, refer to ●*Cable with Loose Wires at One End for CN1 Connection Diagram of JZSP-CSI02-□-E Cable* on the next page.

Selecting Cables

Selecting Cables

(3) Cable with Loose Wires at One End for CN1

External Dimensions of Cable (Units: mm)



Model	Cable Length
JZSP-CSI02-1-E	1 m
JZSP-CSI02-2-E	2 m
JZSP-CSI02-3-E	3 m

● Cable with Loose Wires at One End for CN1

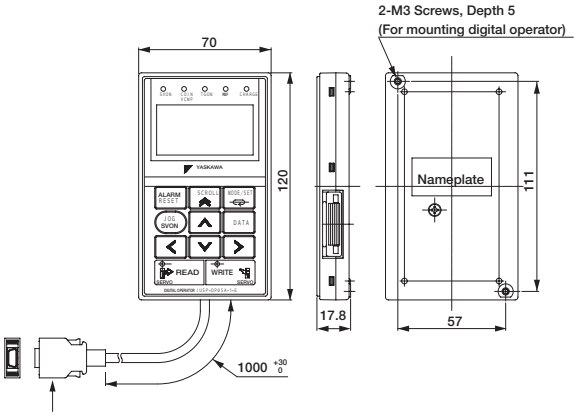
Connection Diagram of JZSP-CSI02-□-E Cable

SERVOPACK End

Pin No.	Signal	Wire Color	Marking		Host Controller End Lead Marker
			Color	Dots	
1	/BK+	Blue	Red	1	1
2	/BK−	Blue	Black	1	2
3	ALM+	Pink	Red	1	3
4	ALM−	Pink	Black	1	4
5	–	Green	Red	1	5
6	+24VIN	Green	Black	1	6
7	P-OT	Orange	Red	1	7
8	N-OT	Orange	Black	1	8
9	/DEC	Gray	Red	1	9
10	/EXT1	Gray	Black	1	10
11	/EXT2	Blue	Red	2	11
12	/EXT3	Blue	Black	2	12
13	/SI0	Pink	Red	2	13
14	BAT (+)	Pink	Black	2	14
15	BAT (−)	Green	Red	2	15
16	SG	Green	Black	2	16
17	PAO	Orange	Red	2	17
18	/PAO	Orange	Black	2	18
19	PBO	Gray	Red	2	19
20	/PBO	Gray	Black	2	20
21	PCO	Blue	Red	3	21
22	/PCO	Blue	Black	3	22
23	/SO2+	Pink	Red	3	23
24	/SO2−	Pink	Black	3	24
25	/SO3+	Green	Red	3	25
26	/SO3−	Green	Black	3	26

: Represents twisted-pair wires.

(4) Digital Operator (Model: JUSP-OP05A-1-E)

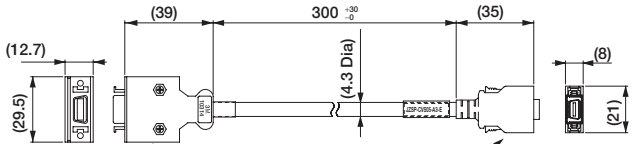


Connector: HDR-E14MAG1+(Honda Tsushin Kogyo Co., Ltd.)
Case: HDR-E14LPA5(Honda Tsushin Kogyo Co., Ltd.)

(5) Digital Operator Converter Cable for CN3 (Model: JZSP-CVS05-A3-E)

A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-Ⅴ series SERVOPACKs.

· External Dimensions (Units: mm)



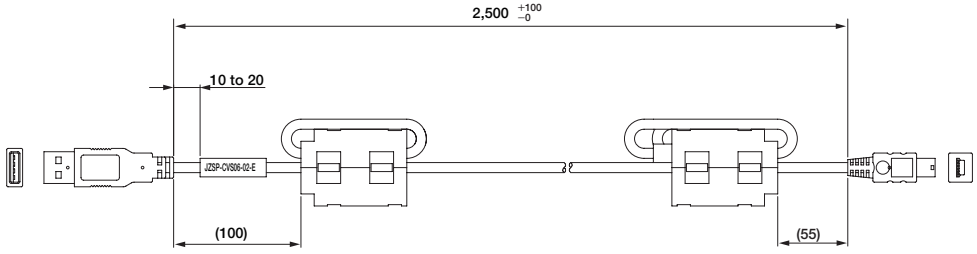
Connector (14-pole): 10214-6202PL
(Sumitomo 3M Ltd.)
Cover: FA458036
(Yasco Components Co., Ltd.)

Connector (14-pole): HDR-E14MAG1+
(Honda Tsushin Kogyo Co., Ltd.)
Cover: HDR-E14LPA5
(Honda Tsushin Kogyo Co., Ltd.)

Selecting Cables

(6) Connection Cable for Personal Computer for CN7 (Model: JZSP-CVS06-02-E)

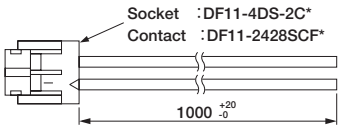
· External Dimensions (Units: mm)



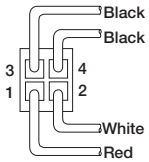
IMPORTANT Use a cable specified by Yaskawa. When using other cables, operation cannot be guaranteed.

(7) Cable for Analog Monitor for CN5 (Model: JZSP-CA01-E)

· External Dimensions (Units: mm)



* : Manufactured by Hirose Electric Corporation.



View from Cable End

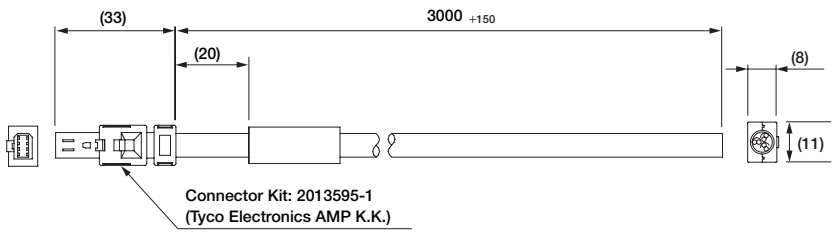
· Specifications

Pin No.	Cable Color	Signal	Standard Settings
1	Red	Analog Monitor 2	Motor speed : 1V/1000 min^{-1}
2	White	Analog Monitor 1	Torque reference : 1V/100% rated torque
3, 4	Black (2 cables)	GND(0V)	–

Note : The specifications above are factory settings. Monitor specifications can be changed by changing parameters Pn006 and Pn007.

(8) Cable with Connector for CN8 (Model: JZSP-CVH03-03-E)

· External Dimensions (Units: mm)

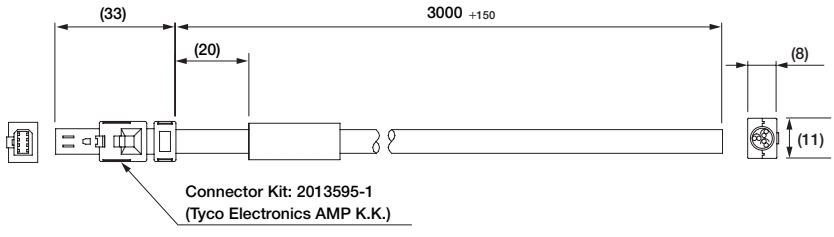


• Specifications

Pin No.	Signal	Lead Color	Marking Color
1	Not used	–	–
2	Not used	–	–
3	/HWBB1–	White	Black
4	/HWBB1+	White	Red
5	/HWBB2–	Gray	Black
6	/HWBB2+	Gray	Red
7	EDM1–	Orange	Black
8	EDM1+	Orange	Red

(Model: JZSP-CVH03-03-E-G3)

• External Dimensions (Units: mm)



• Specifications

Pin No.	Signal	Lead Color	Marking Color
1	Not used	–	–
2	Not used	–	–
3	/HWBB1–	White	–
4	/HWBB1+	Brown	–
5	/HWBB2–	Green	–
6	/HWBB2+	Yellow	–
7	EDM1–	Grey	–
8	EDM1+	Pink	–

SERVOPACK External Dimensions

SERVOPACK external dimensions are described for each model, without option module and with option module, in the following pages.

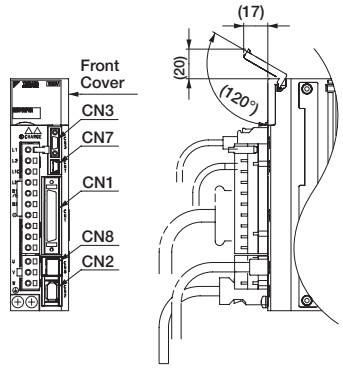
SERVOPACK	Mounting	Without Option Module	With Option Module
Analog Voltage/Pulse Train Reference SERVOPACK, MECHATROLINK-Ⅱ Communications Reference SERVOPACK, MECHATROLINK-Ⅲ Communications Reference SERVOPACK	Base-mounted	Page 274 to 279	Page 286 to 293
	Rack-mounted*	Page 280 to 285	Page 294 to 301
Command Option Attachable Type SERVOPACK	Base-mounted	–	Page 286 to 293
	Rack-mounted*	–	Page 294 to 301

*: SERVOPACKs of 6 kW or more are duct-ventilated.

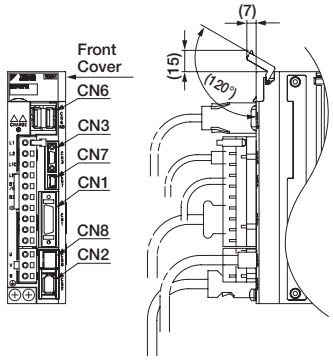
● Dimensional Drawings

All drawings on the following pages show the exterior of the analog voltage/pulse train SERVOPACK (page 274 to 301) as examples. Refer to the drawings on this page for information (dimensions of connections and front covers) on specific SERVOPACK models.

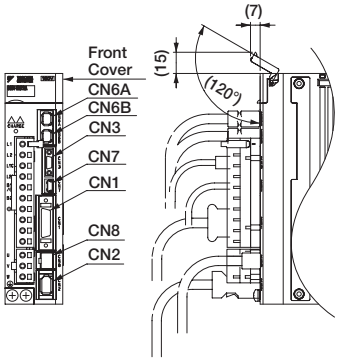
● Analog Voltage/Pulse Train Reference SERVOPACK



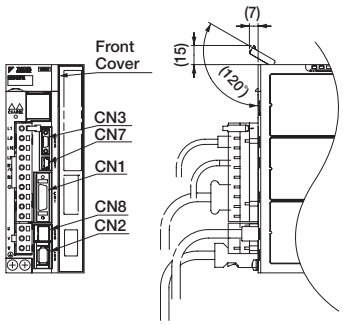
● MECHATROLINK-Ⅱ Communications Reference SERVOPACK



● MECHATROLINK-Ⅲ Communications Reference SERVOPACK



● Command Option Attachable Type SERVOPACK



Connector

Port	Model	Pin	Manufacturer
CN1*1	10250-52A2PL	50	Sumitomo 3M Ltd.
CN1*2	10226-52A2PL	26	Sumitomo 3M Ltd.
CN2	53984-0671	6	Molex Japan Co., Ltd.
CN3	HDR-EC14LFDTN-SLE-PLUS	14	Honda Tsushin Kogyo Co., Ltd.
CN6	1903815-1	8	Tyco Electronics AMP K.K.
CN6A	1981386-1	8	Tyco Electronics AMP K.K.
CN6B	1981386-1	8	Tyco Electronics AMP K.K.
CN7	MNC23-5K5H00	5	ADVANCED-CONNECTEK INC.
CN8	1981080-1	8	Tyco Electronics AMP K.K.

*1: For Analog Voltage/Pulse Train Reference Type SERVOPACKs

*2: For MECHATROLINK-Ⅱ/Ⅲ Communications Reference Type SERVOPACKs and INDEXER Module Type SERVOPACKs.

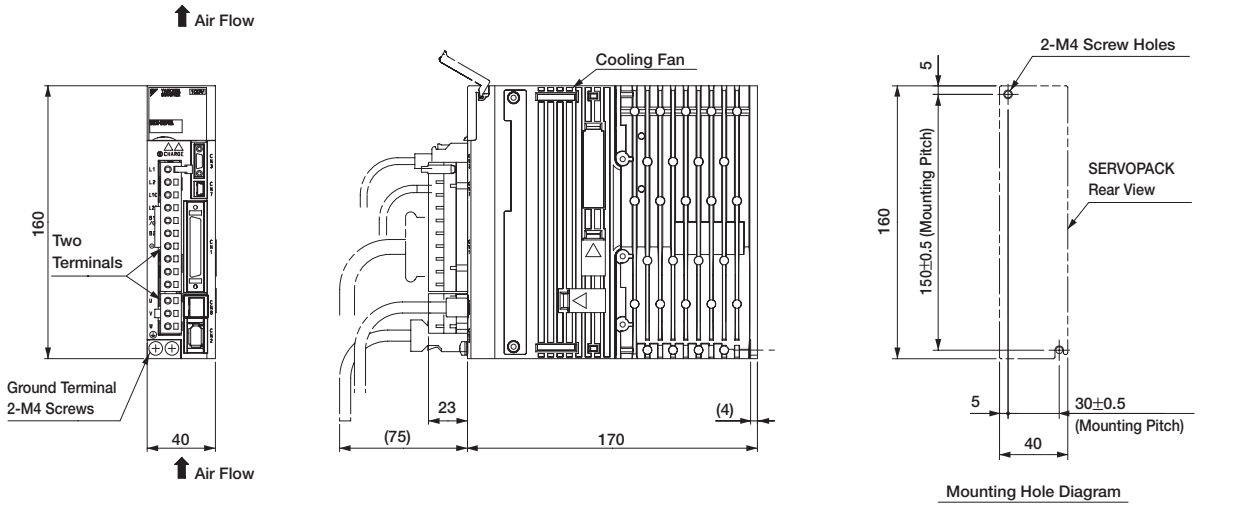
Note: The connectors above or their equivalents are used for SERVOPACKs.

Note: Base-mounted SERVOPACKs can be mounted on a rack by using metal fittings for rack-mounting. Contact your Yaskawa representative for details.

External Dimensions Units: mm (Without Option Module)

● Base-Mounted SERVOPACKs

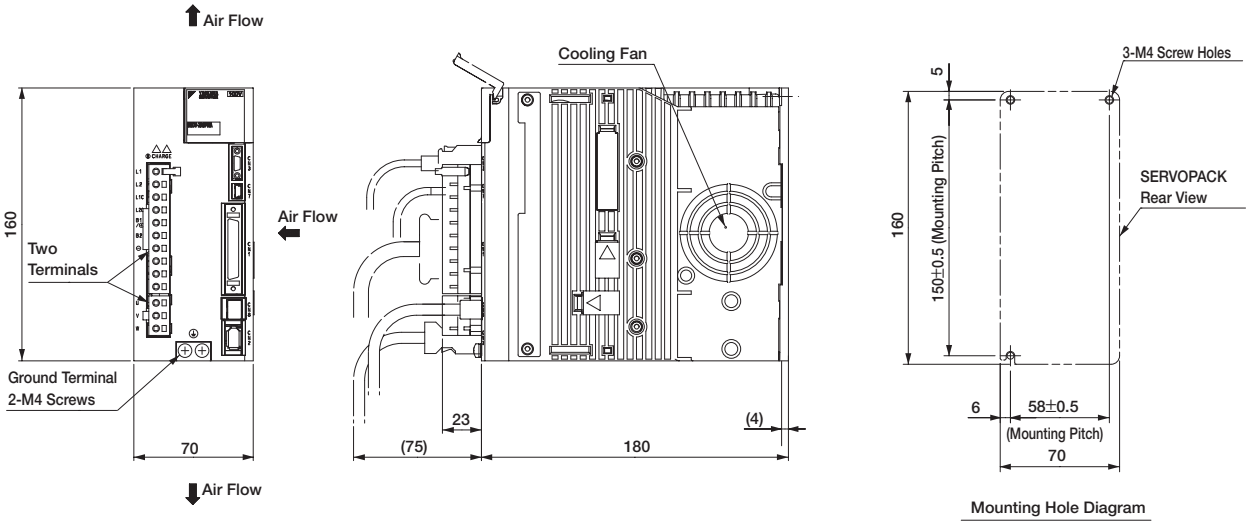
(1) Single-phase 100 VAC, Model: SGDV-R70F□□A, -R90F□□A, and -2R1F□□A



Mounting Hole Diagram

Approx. Mass: 1.0 kg

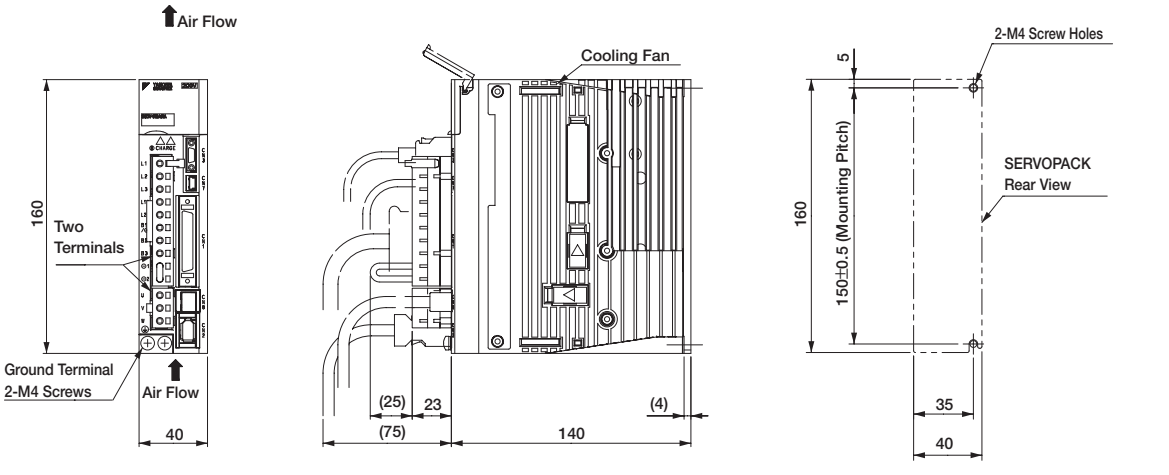
(2) Single-phase 100 VAC, Model: SGDV-2R8F□□A



Mounting Hole Diagram

Approx. Mass: 1.5 kg

(3) Three-phase 200 VAC, Model: SGDV-R70A□□A, -R90A□□A, and -1R6A□□A



Mounting Hole Diagram

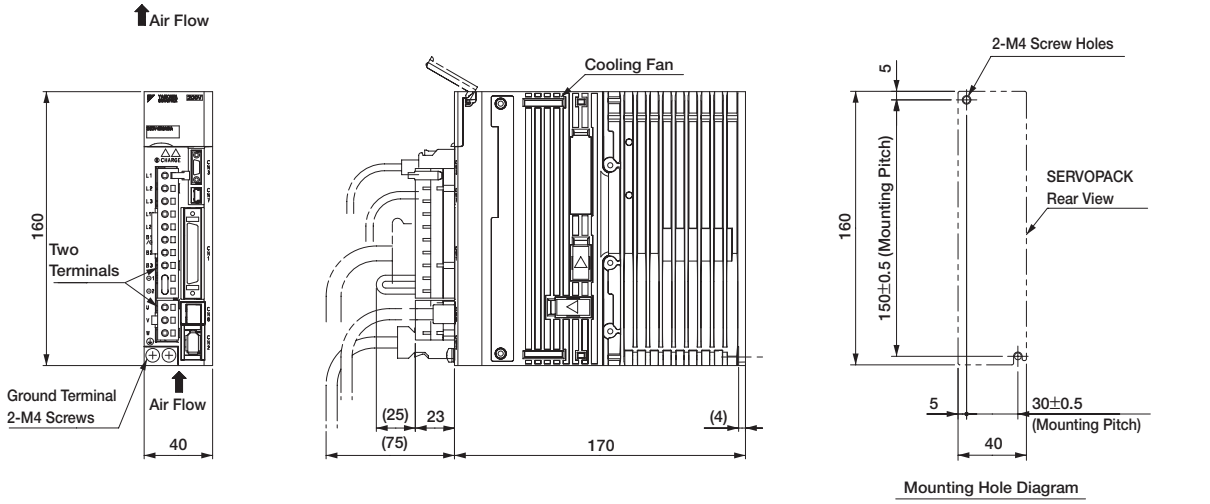
Approx. Mass: 0.9 kg

SERVOPACK External Dimensions

External Dimensions Units: mm (Without Option Module)

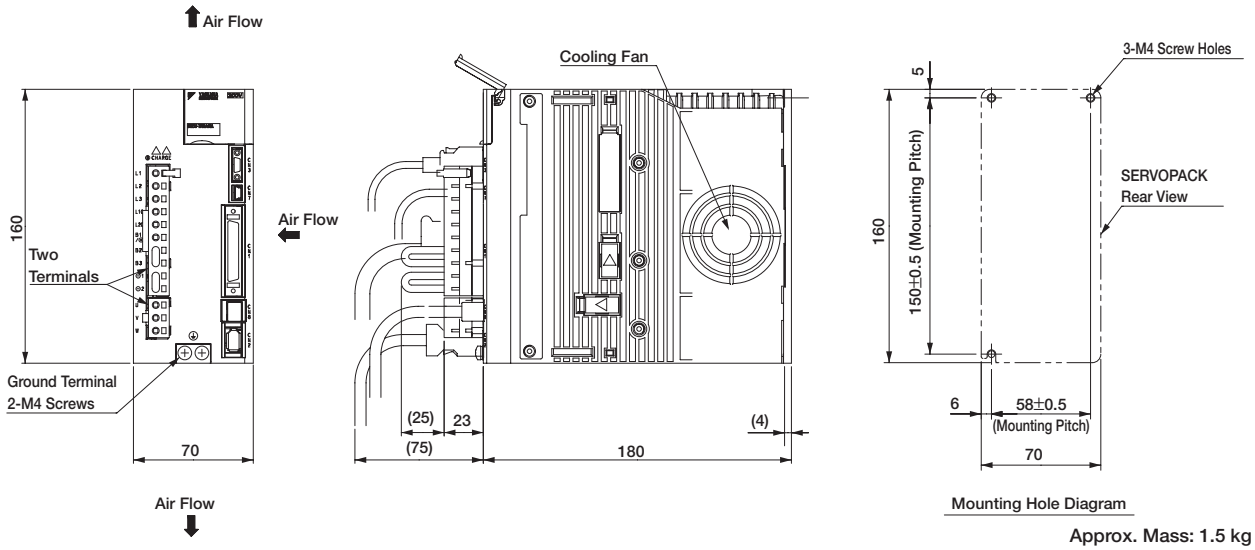
●Base-Mounted SERVOPACKs

(4) Three-phase 200 VAC, Model: SGDV-2R8A□□A



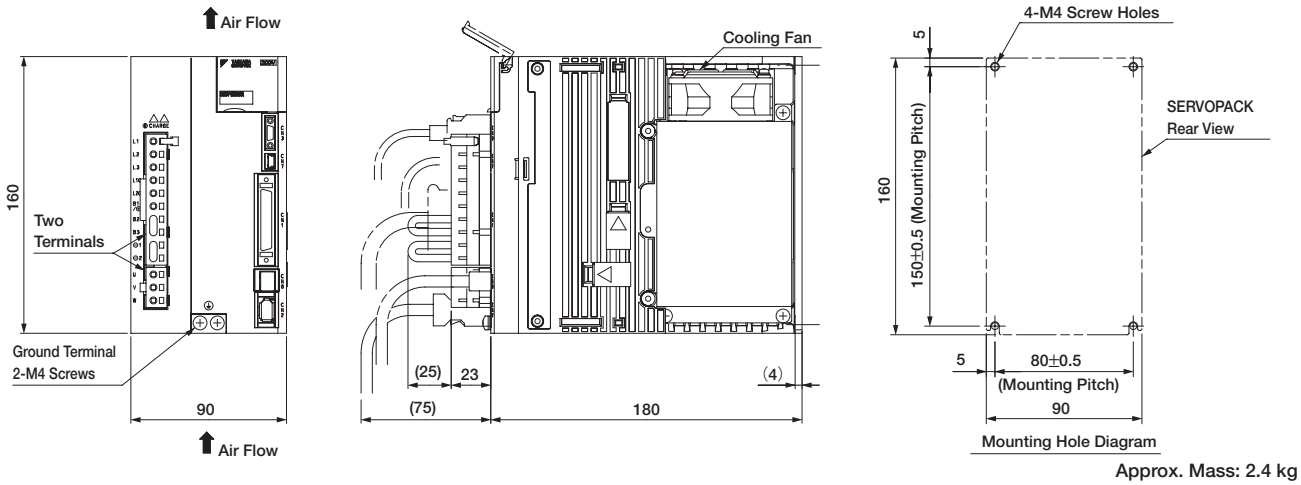
Approx. Mass: 1.0 kg

(5) Three-phase 200 VAC, Model: SGDV-3R8A□□A, -5R5A□□A, and -7R6A□□A



Approx. Mass: 1.5 kg

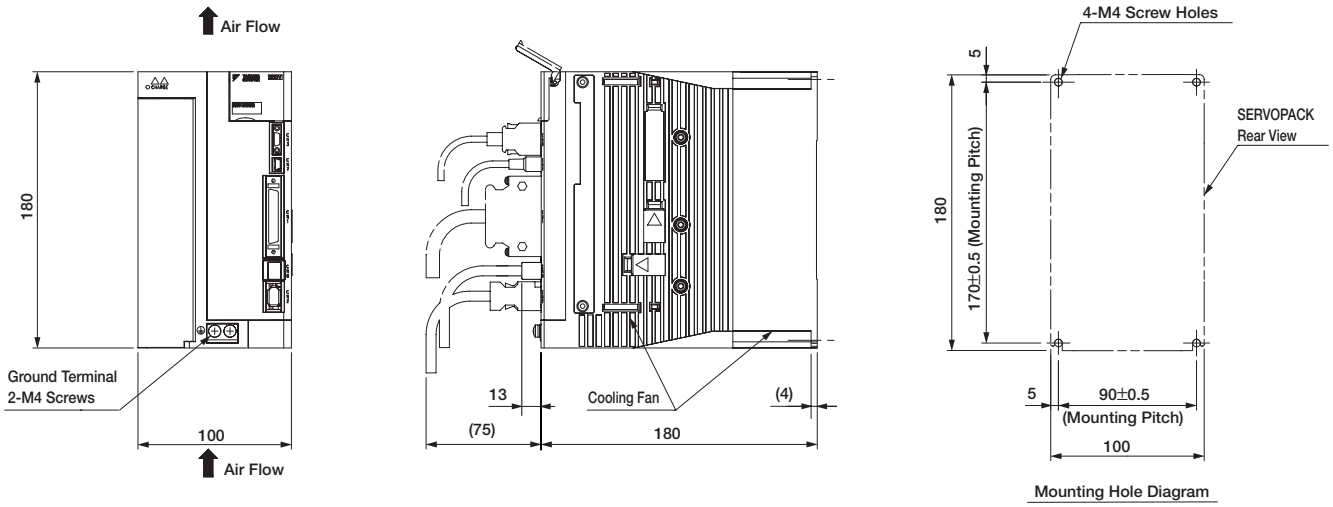
(6) Three-phase 200 VAC, Model: SGDV-120A□□A



Approx. Mass: 2.4 kg

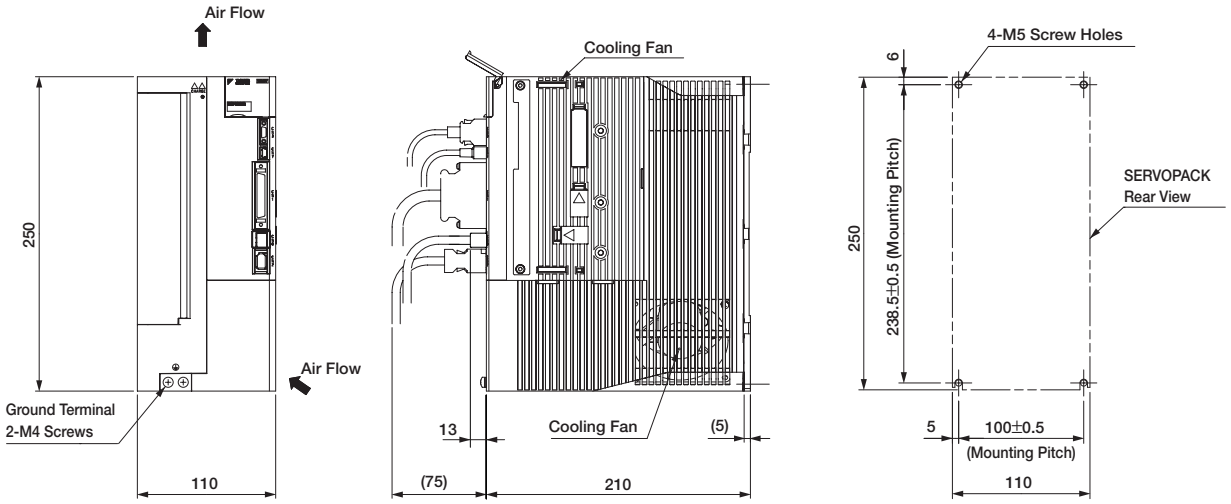
External Dimensions Units: mm (Without Option Module)

(7) Single-phase 200 VAC, Model: SGDV-120A□1A008000 (1.5kW, single-phase input)
Three-phase 200 VAC, Model: SGDV-180A□□A and -200A□□A



Approx. Mass: 2.8 kg

(8) Three-phase 200 VAC, Model: SGDV-330A□□A

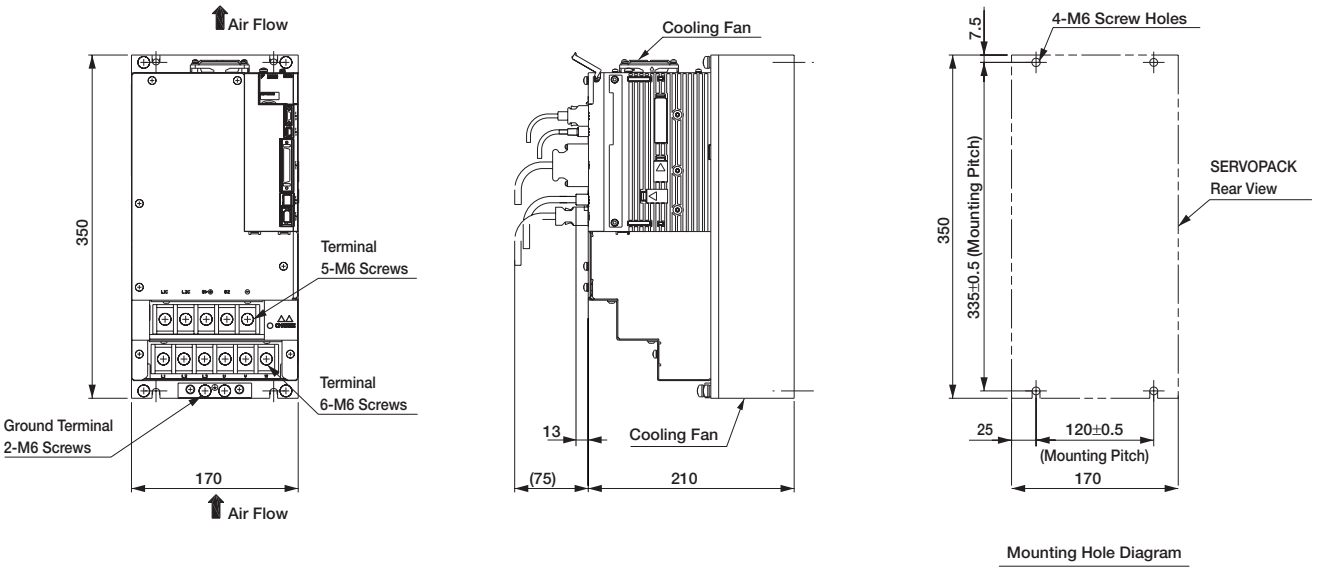


Approx. Mass: 4.6 kg

External Dimensions Units: mm (Without Option Module)

●Base-Mounted SERVOPACKs

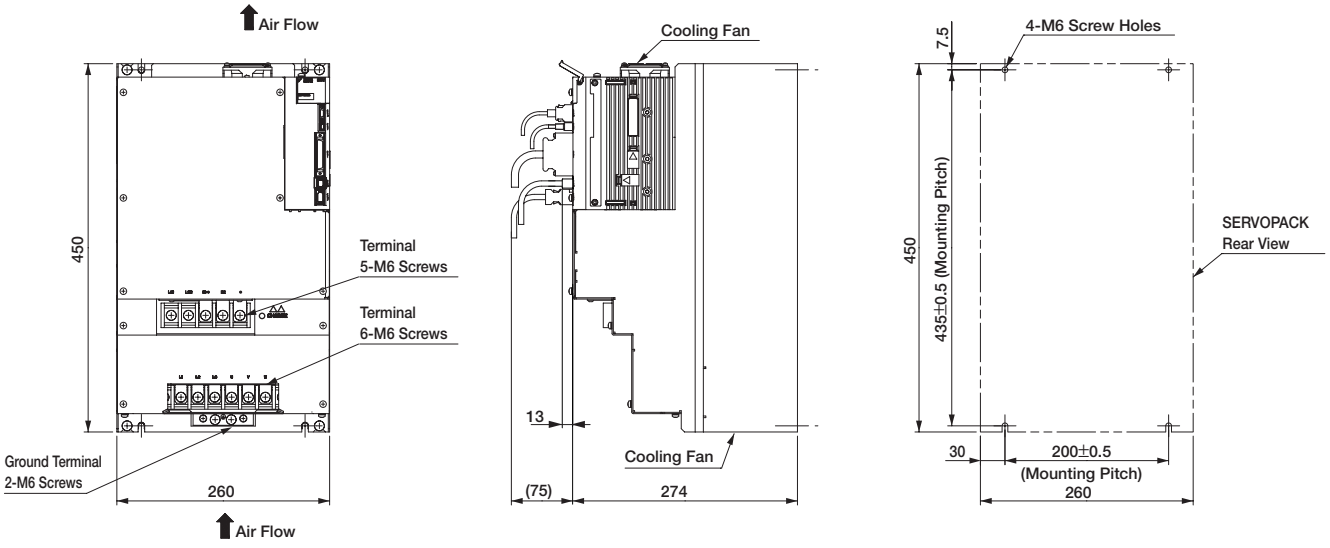
(9) Three-phase 200 VAC, Model: SGDV-470A□□A and -550A□□A



Mounting Hole Diagram

Approx. Mass: 10.2 kg

(10) Three-phase 200 VAC, Model: SGDV-590A□□A and -780A□□A

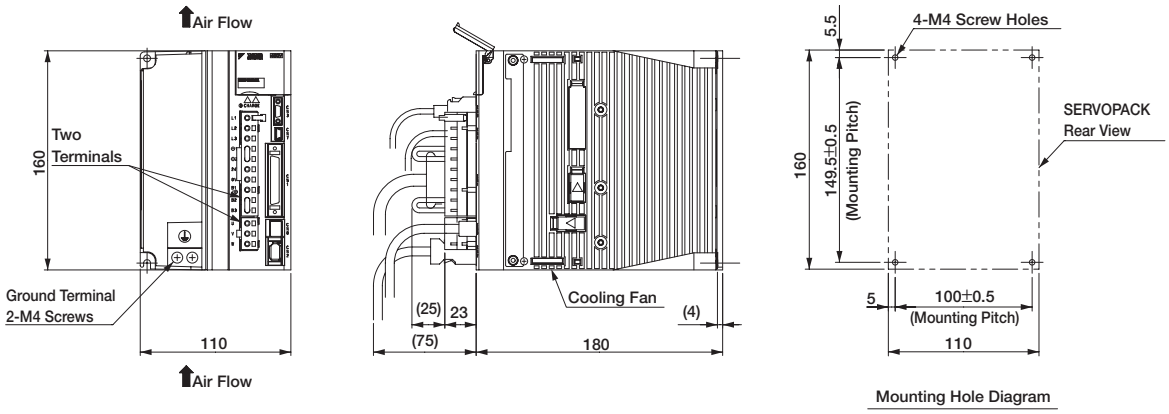


Mounting Hole Diagram

Approx. Mass: 21.3 kg

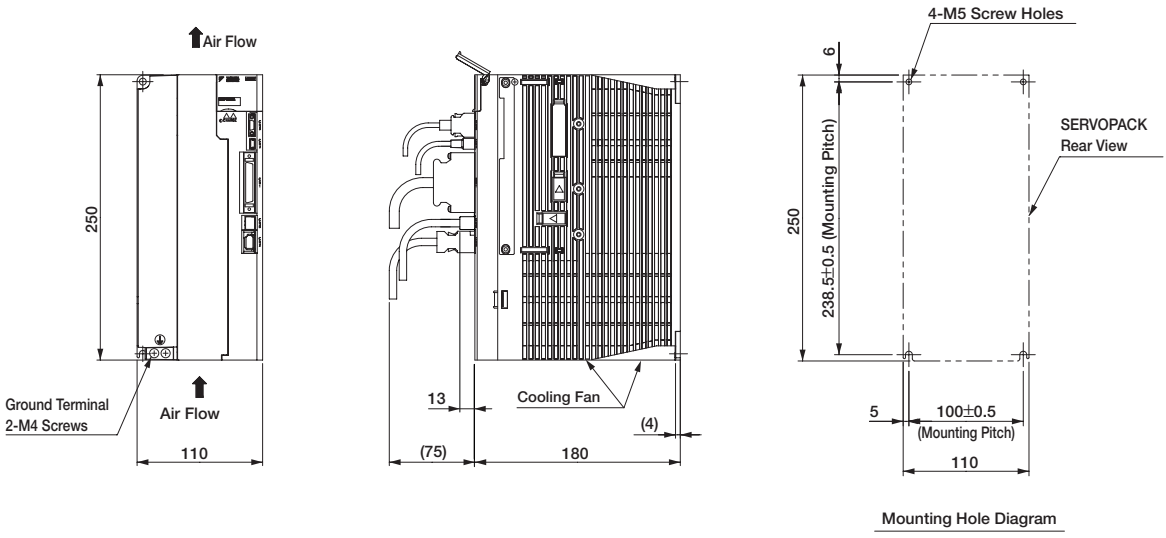
External Dimensions Units: mm (Without Option Module)

(11) Three-phase 400 VAC, Model: SGDV-1R9D□□A, -3R5D□□A, and -5R4D□□A



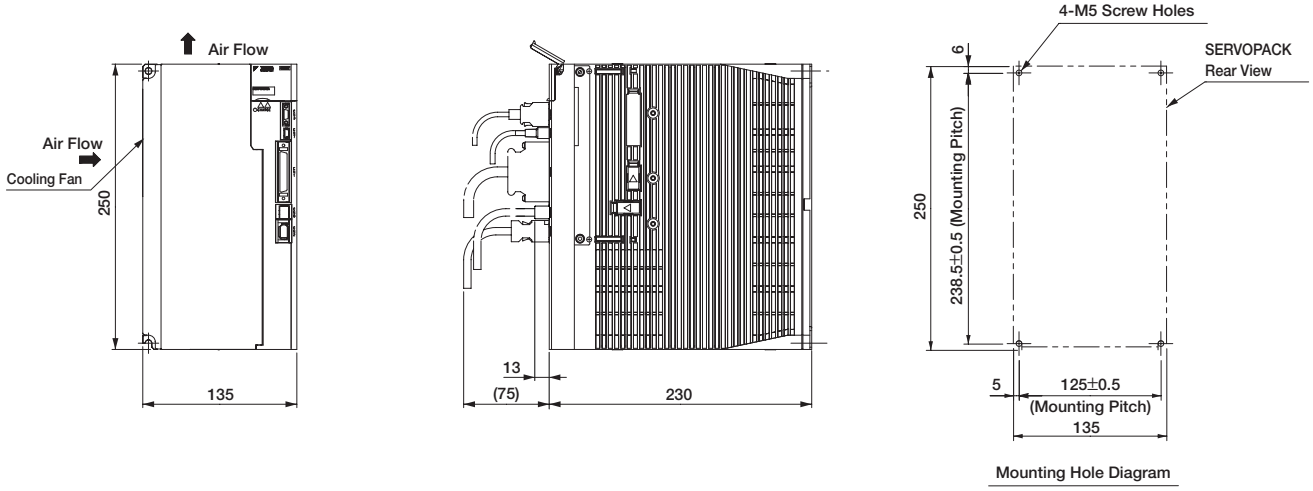
Approx. Mass: 2.7 kg

(12) Three-phase 400 VAC, Model: SGDV-8R4D□□A and -120D□□A



Approx. Mass: 3.7 kg

(13) Three-phase 400 VAC, Model: SGDV-170D□□A

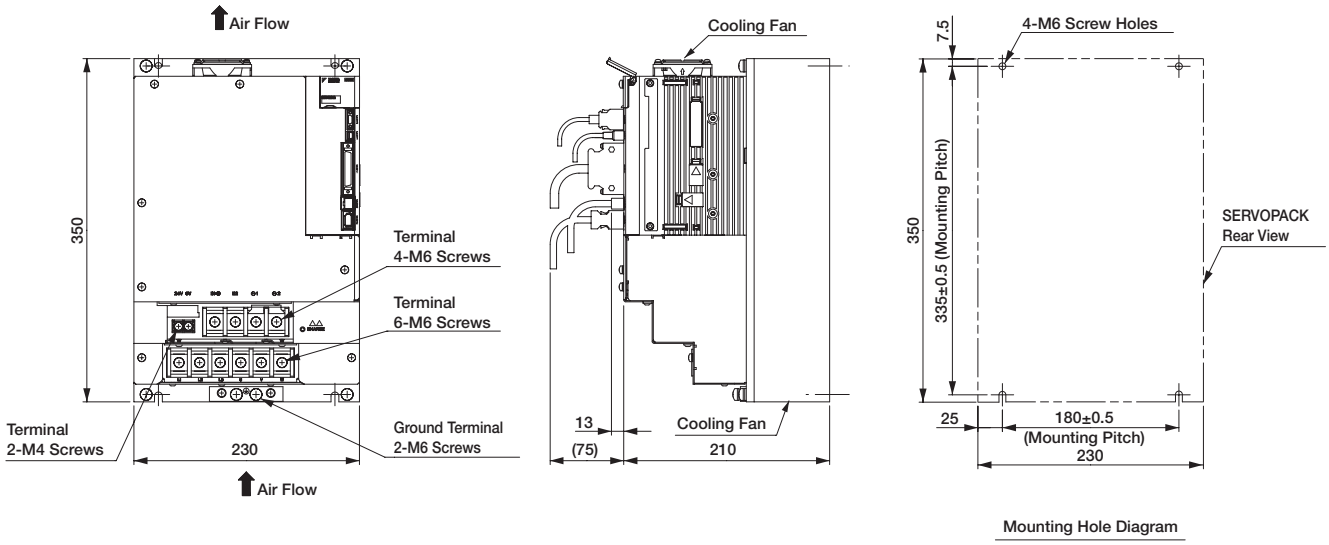


Approx. Mass: 5.6 kg

External Dimensions Units: mm (Without Option Module)

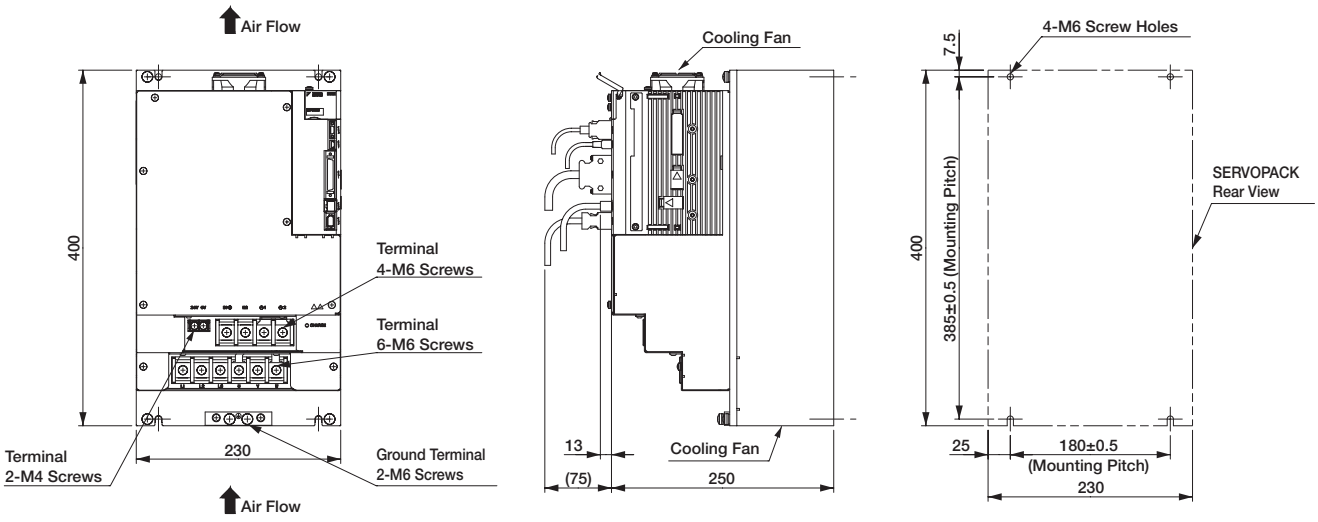
●Base-Mounted SERVOPACKs

(14) Three-phase 400 VAC, Model: SGDV-210D□□A and -260D□□A



Approx. Mass: 11.3 kg

(15) Three-phase 400 VAC, Model: SGDV-280D□□A and -370D□□A

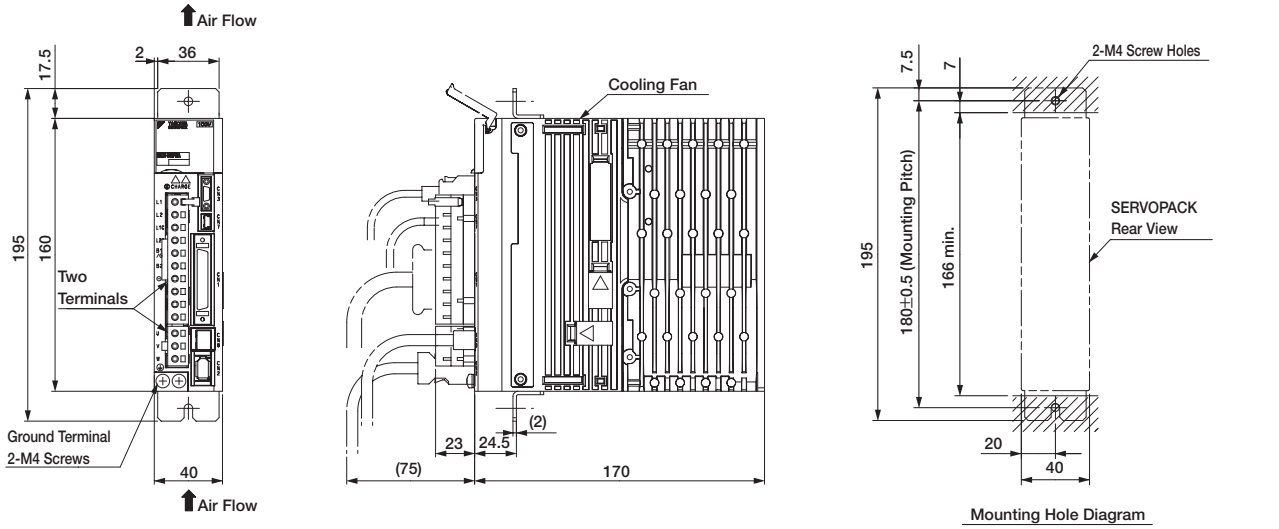


Approx. Mass: 16.2 kg

External Dimensions Units: mm (Without Option Module)

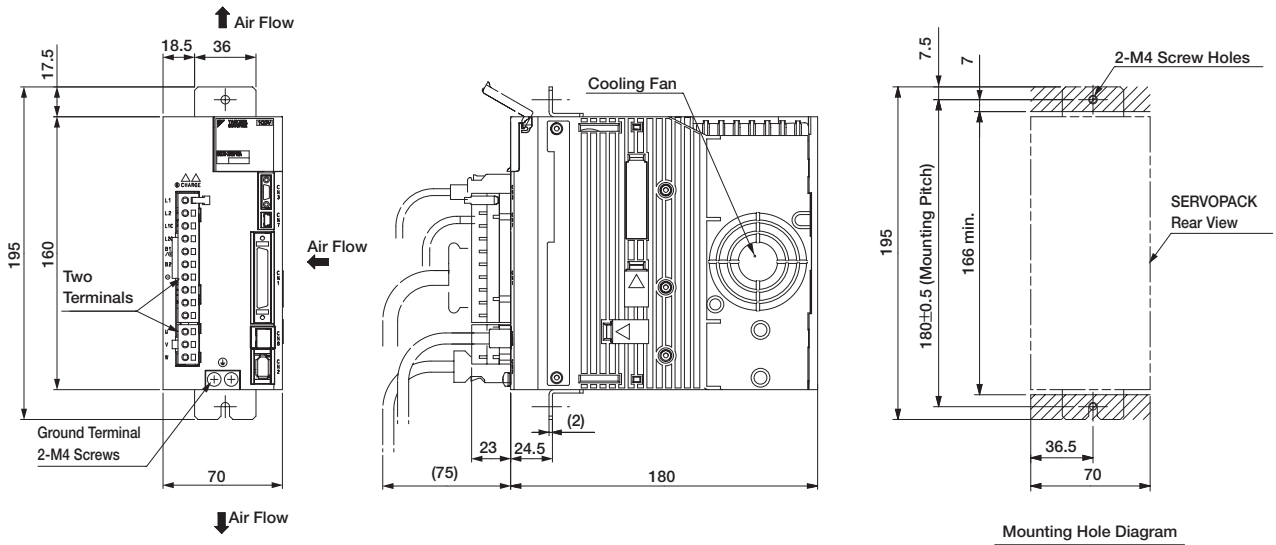
●Rack-mounted SERVOPACKs (6 kW or more models: duct-ventilated)

(1) Single-phase 100 VAC, Model: SGDV-R70F□□A001, -R90F□□A001, and -2R1F□□A001



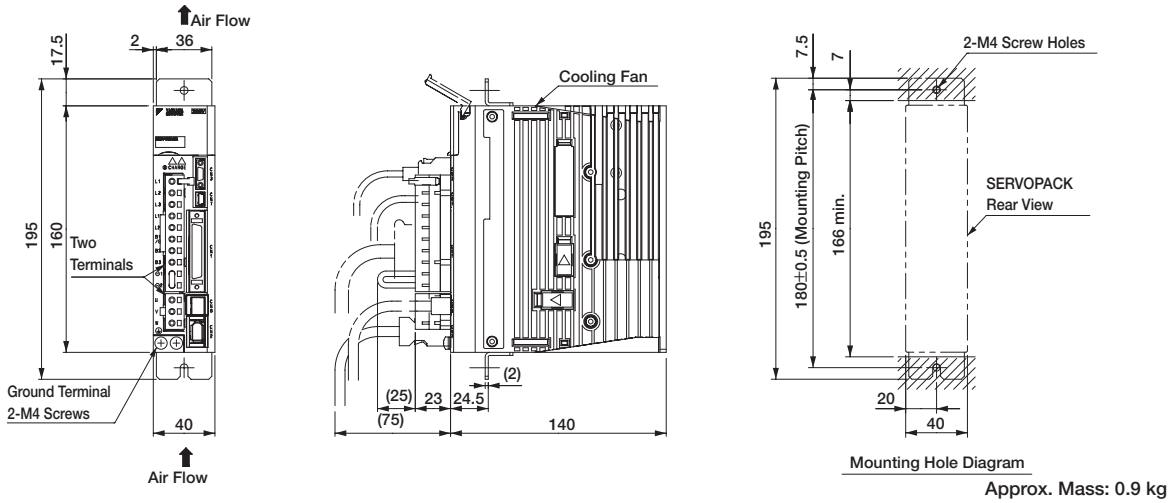
Approx. Mass: 1.1 kg

(2) Single-phase 100 VAC, Model: SGDV-2R8F□□A001



Approx. Mass: 1.5 kg

(3) Three-phase 200 VAC, Model: SGDV-R70A□□A001, -R90A□□A001, and -1R6A□□A001



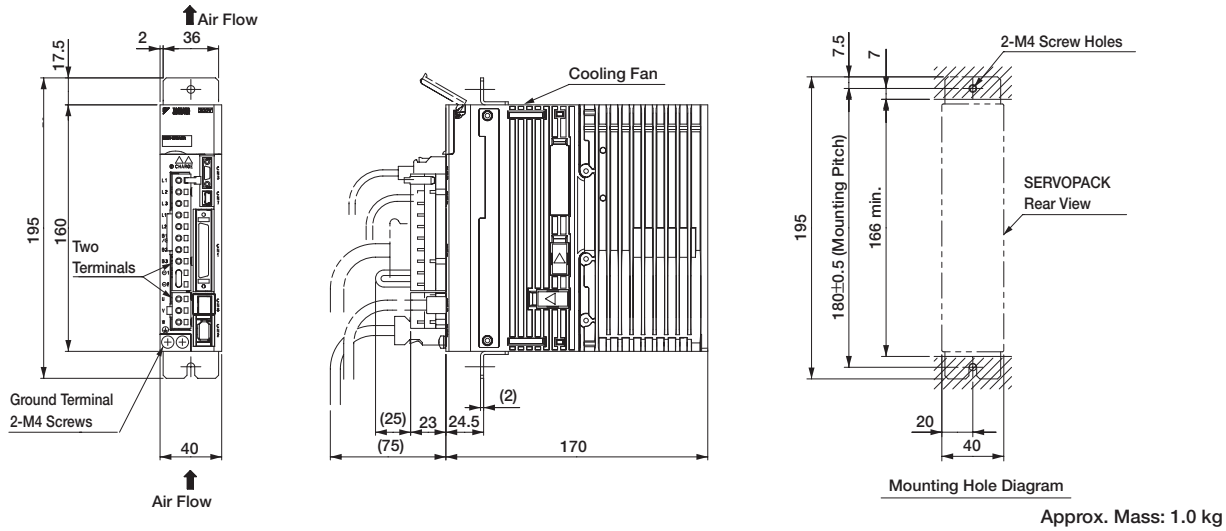
Approx. Mass: 0.9 kg

SERVOPACK External Dimensions

External Dimensions Units: mm (Without Option Module)

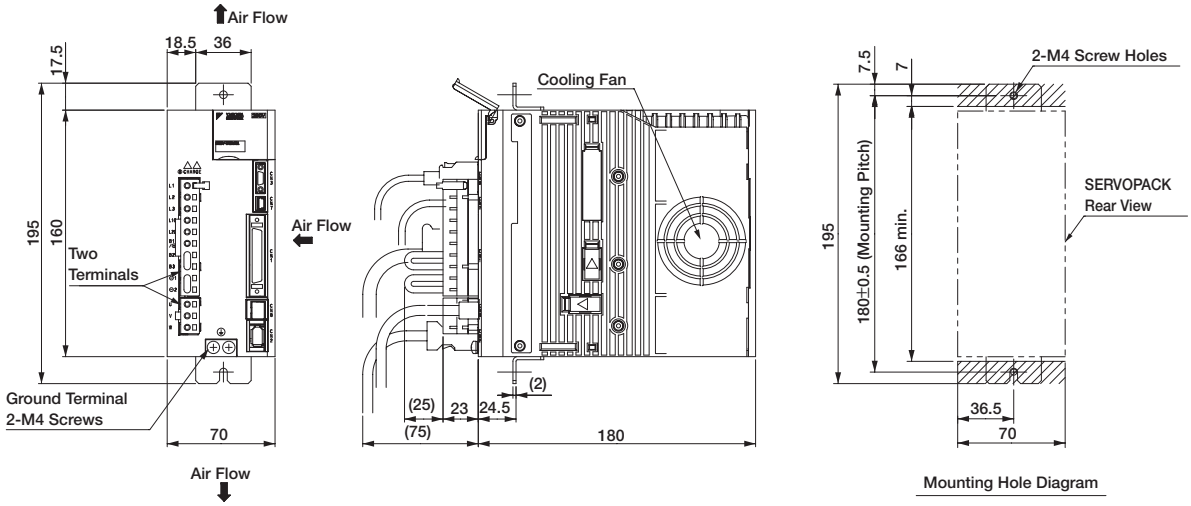
●Rack-mounted SERVOPACKs (6 kW or more models: duct-ventilated)

(4) Three-phase 200 VAC, Model: SGDV-2R8A□□A001



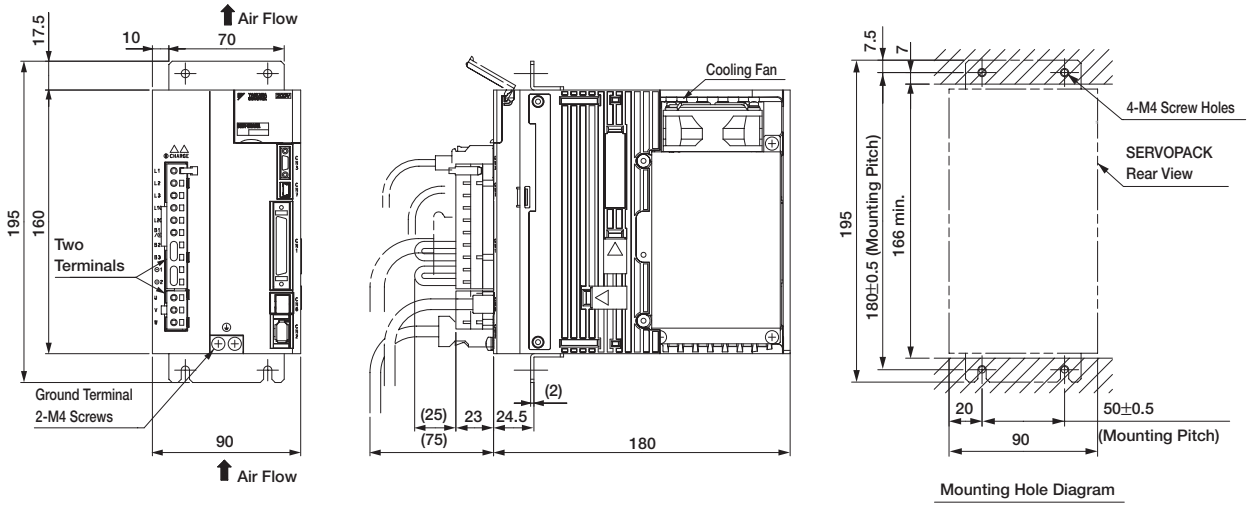
Approx. Mass: 1.0 kg

(5) Three-phase 200 VAC, Model: SGDV-3R8A□□A001, -5R5A□□A001, and -7R6A□□A001



Approx. Mass: 1.5 kg

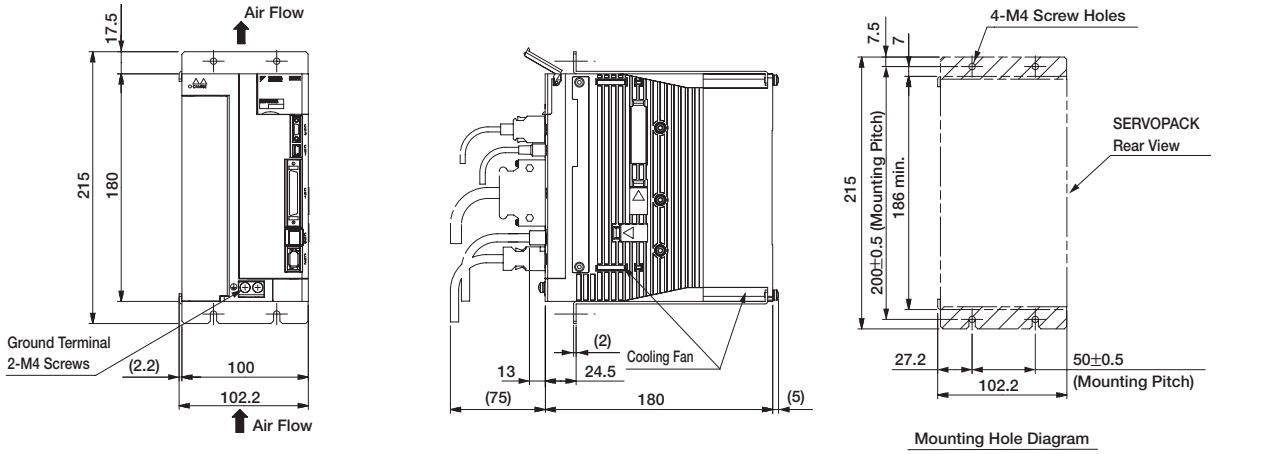
(6) Three-phase 200 VAC, Model: SGDV-120A□□A001



Approx. Mass: 2.5 kg

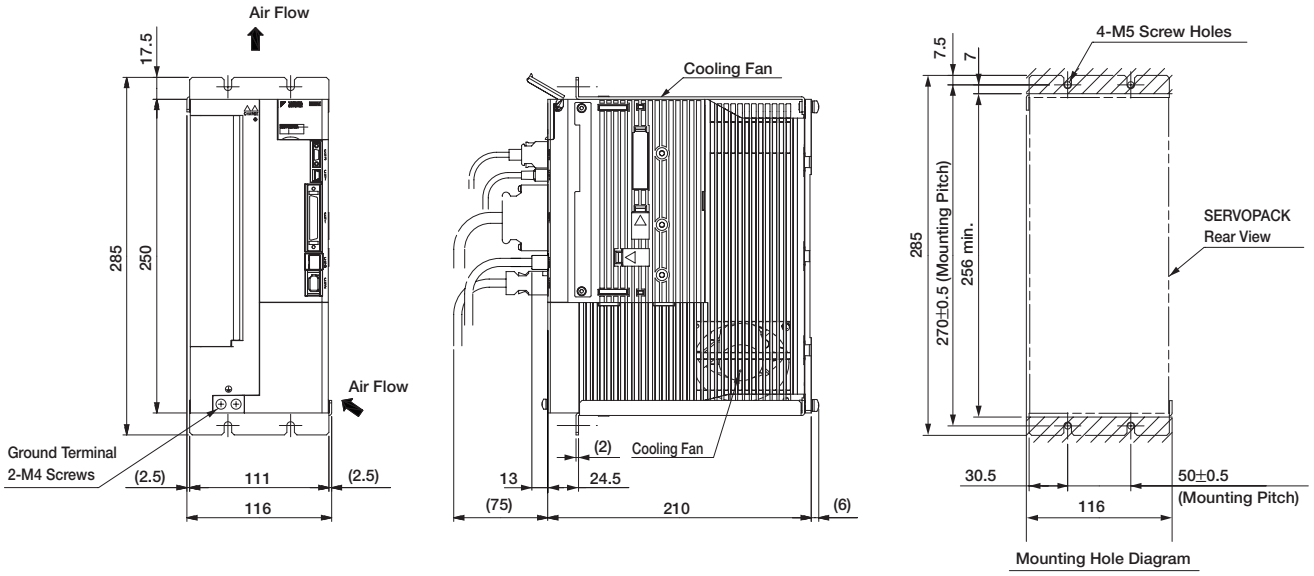
External Dimensions Units: mm (Without Option Module)

(7) Three-phase 200 VAC, Model: SGDV-180A□□A001 and -200A□□A001



Approx. Mass: 3.1 kg

(8) Three-phase 200 VAC, Model: SGDV-330A□□A001



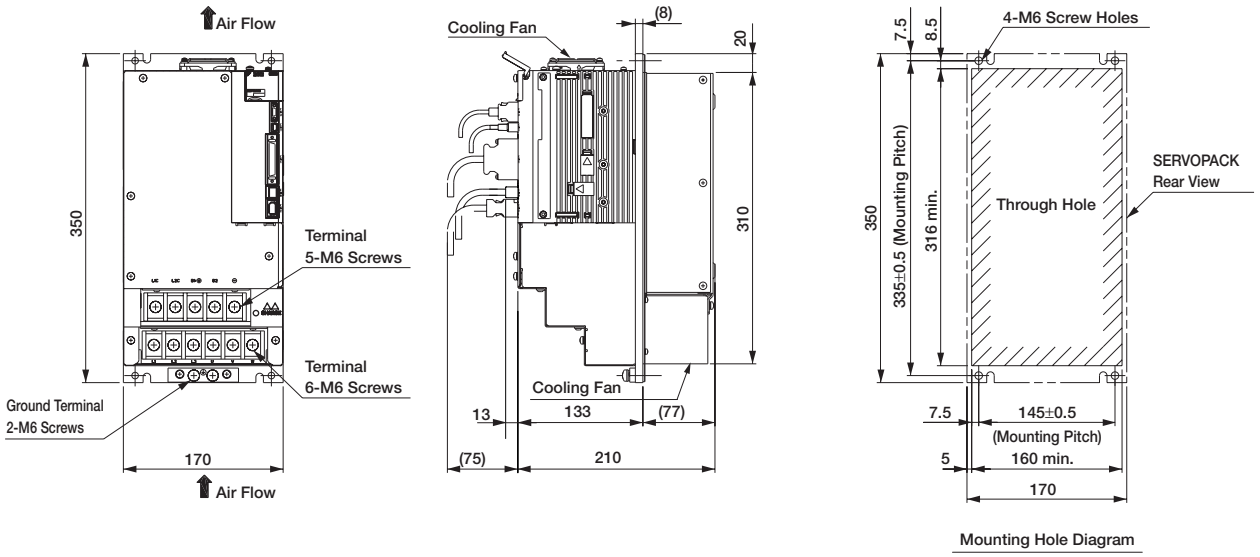
Approx. Mass: 5.0 kg

SERVOPACK External Dimensions

External Dimensions Units: mm (Without Option Module)

●Rack-mounted SERVOPACKs (6 kW or more models: duct-ventilated)

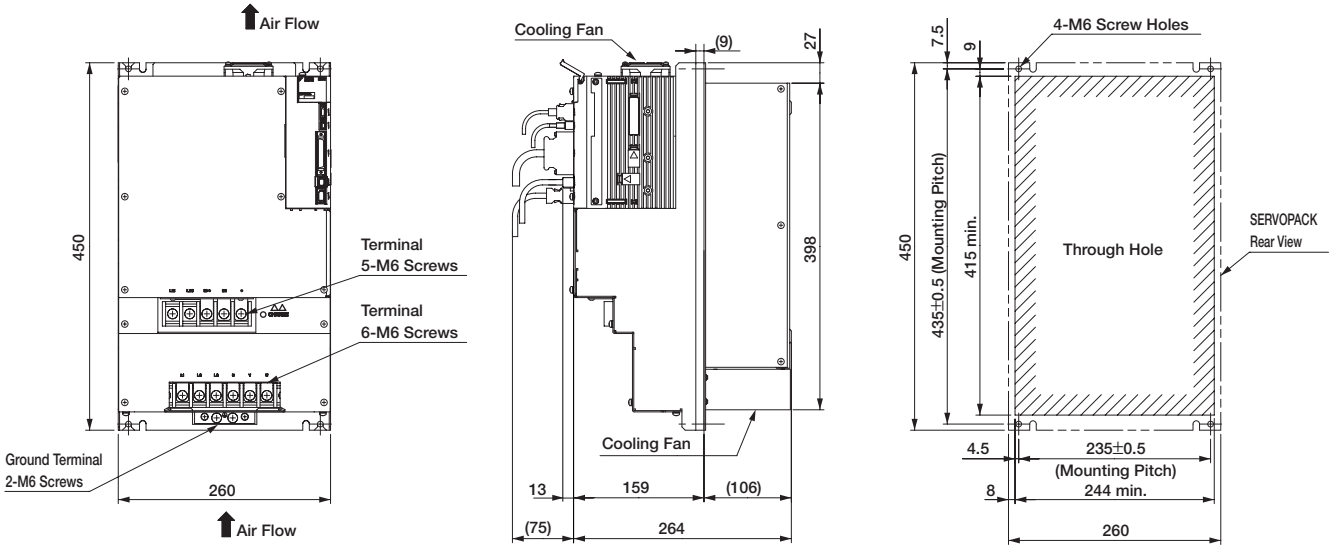
(9) Three-phase 200 VAC, Model: SGDV-470A□□A001 and -550A□□A001 (duct-ventilated)



Mounting Hole Diagram

Approx. Mass: 8.5 kg

(10) Three-phase 200 VAC, Model: SGDV-590A□□A001 and -780A□□A001 (duct-ventilated)

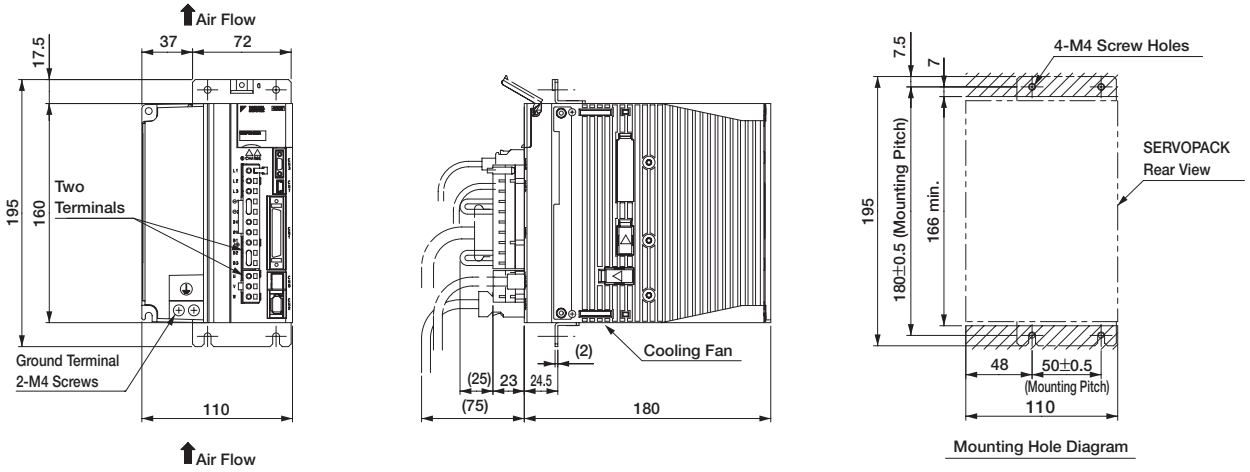


Mounting Hole Diagram

Approx. Mass: 16.3 kg

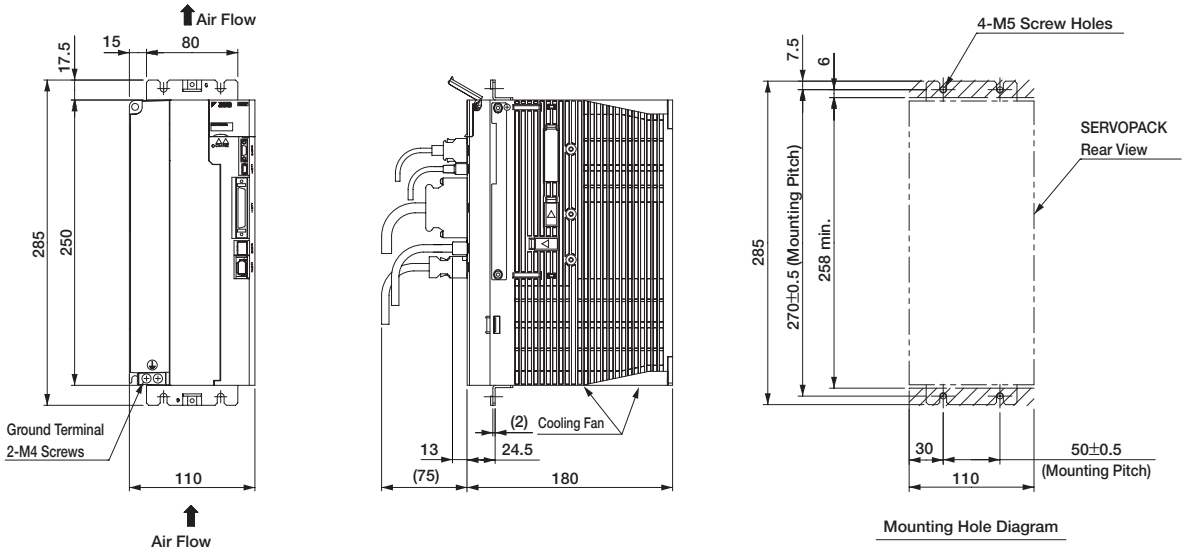
External Dimensions Units: mm (Without Option Module)

(11) Three-phase 400 VAC, Model: SGDV-1R9D□□A001, -3R5D□□A001, and -5R4D□□A001



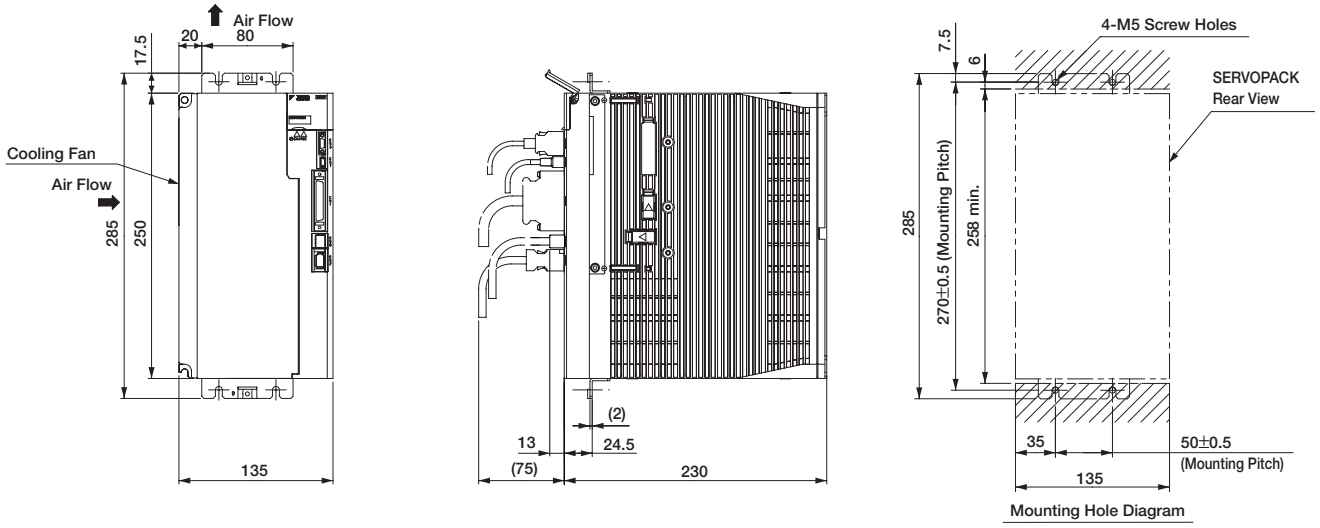
Approx. Mass: 2.7 kg

(12) Three-phase 400 VAC, Model: SGDV-8R4D□□A001 and -120D□□A001



Approx. Mass: 3.7 kg

(13) Three-phase 400 VAC, Model: SGDV-170D□□A001

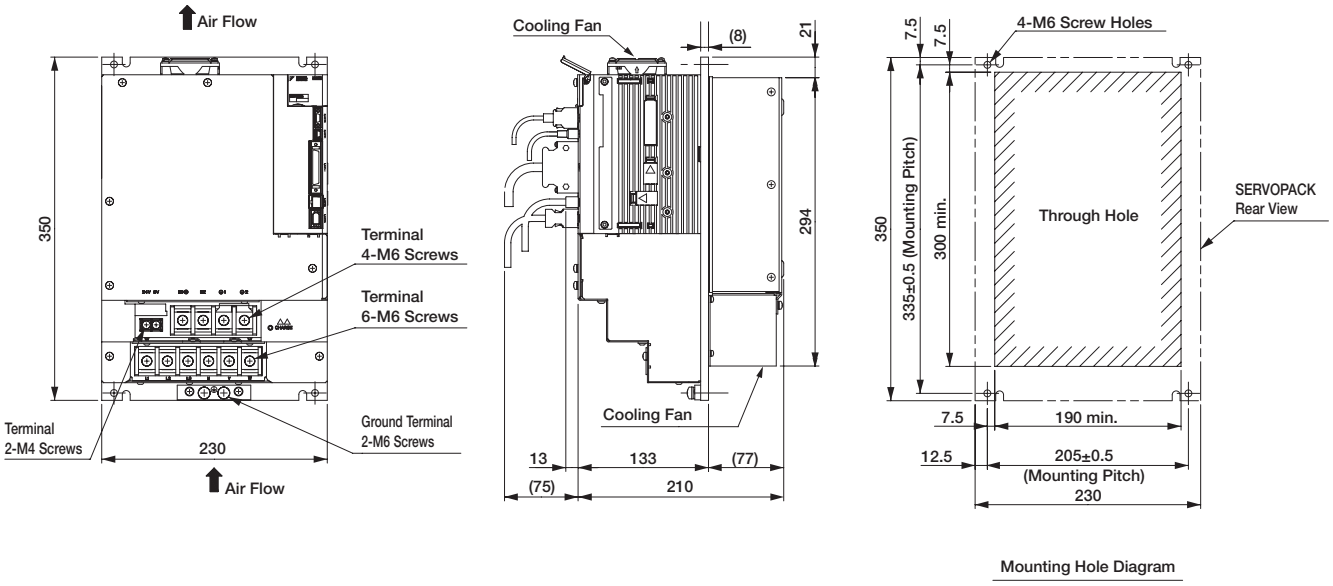


Approx. Mass: 5.7 kg

External Dimensions Units: mm (Without Option Module)

●Rack-mounted SERVOPACKs (6 kW or more models: duct-ventilated)

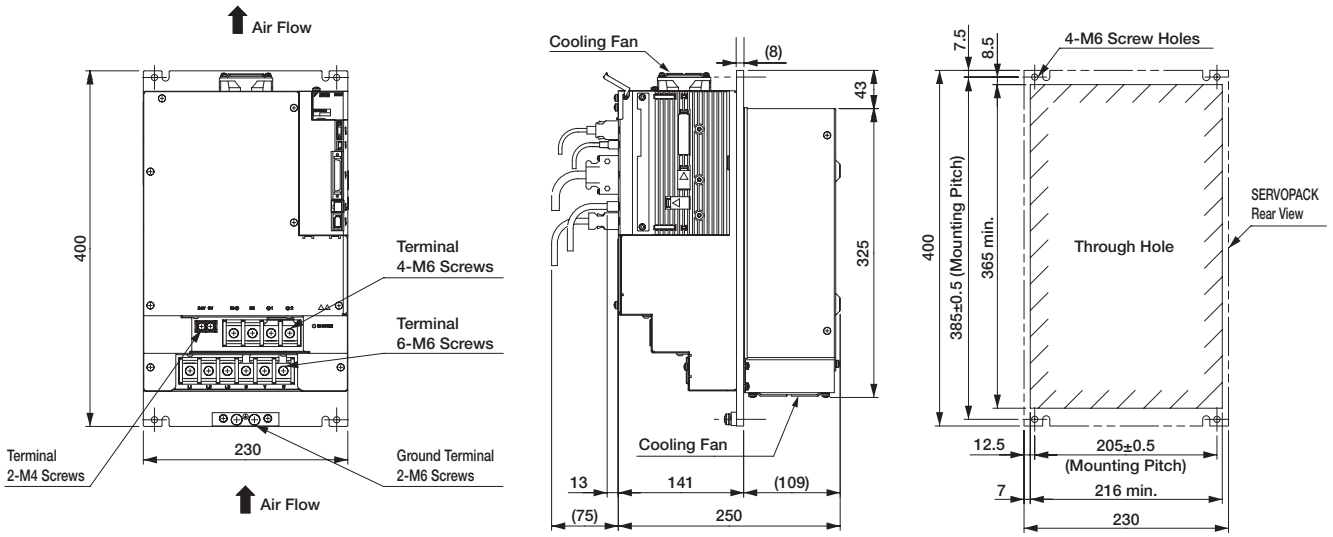
(14) Three-phase 400 VAC, Model: SGDV-210D□□A001 and -260D□□A001 (duct-ventilated)



Mounting Hole Diagram

Approx. Mass: 8.1 kg

(15) Three-phase 400 VAC, Model: SGDV-280D□□A001 and -370D□□A001 (duct-ventilated)



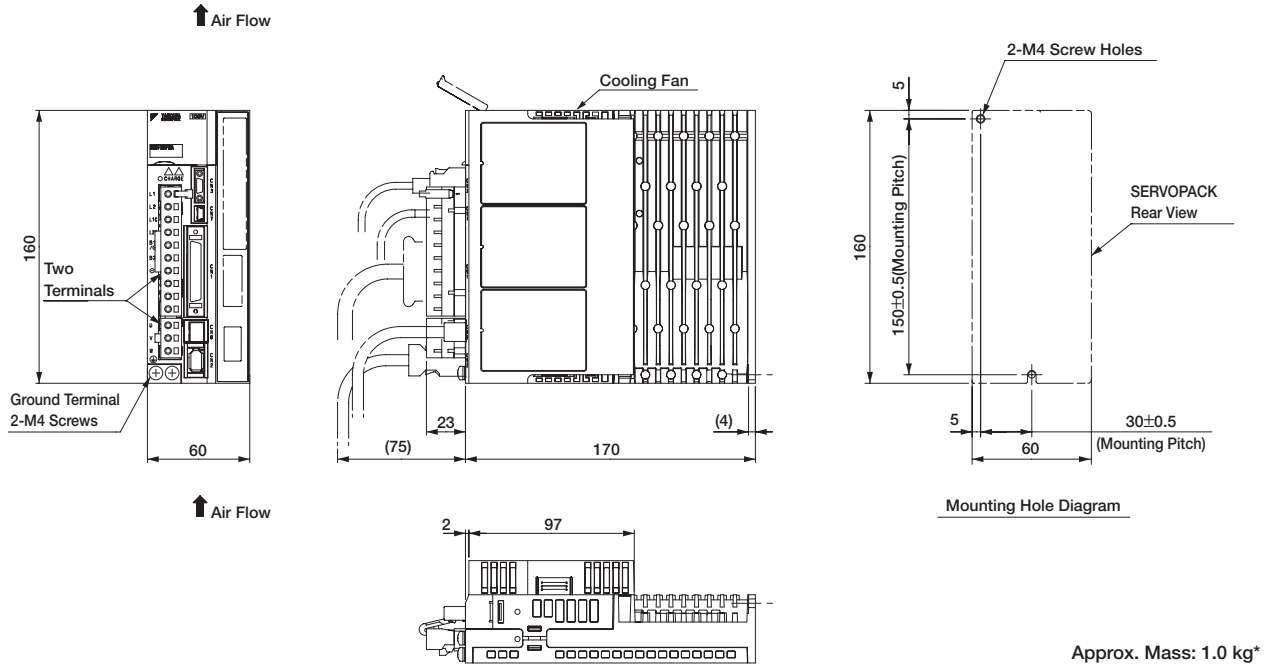
Mounting Hole Diagram

Approx. Mass: 13.4 kg

External Dimensions Units: mm (With Option Module)

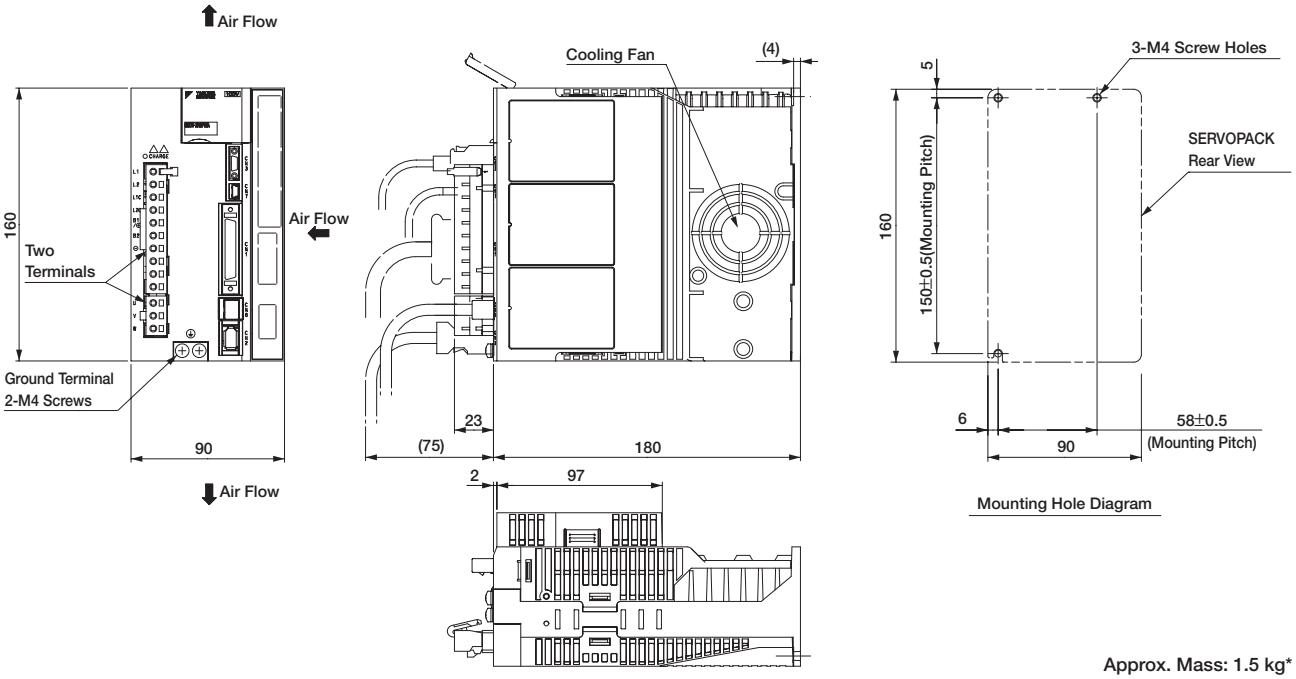
●Base-Mounted SERVOPACKs

(1) Single-phase 100 VAC,
Model: SGDVR70F□□A000000□□□, SGDVR90F□□A000000□□□, and SGDV2R1F□□A000000□□□



Approx. Mass: 1.0 kg*

(2) Single-phase 100 VAC, Model: SGDV2R8F□□A000000□□□



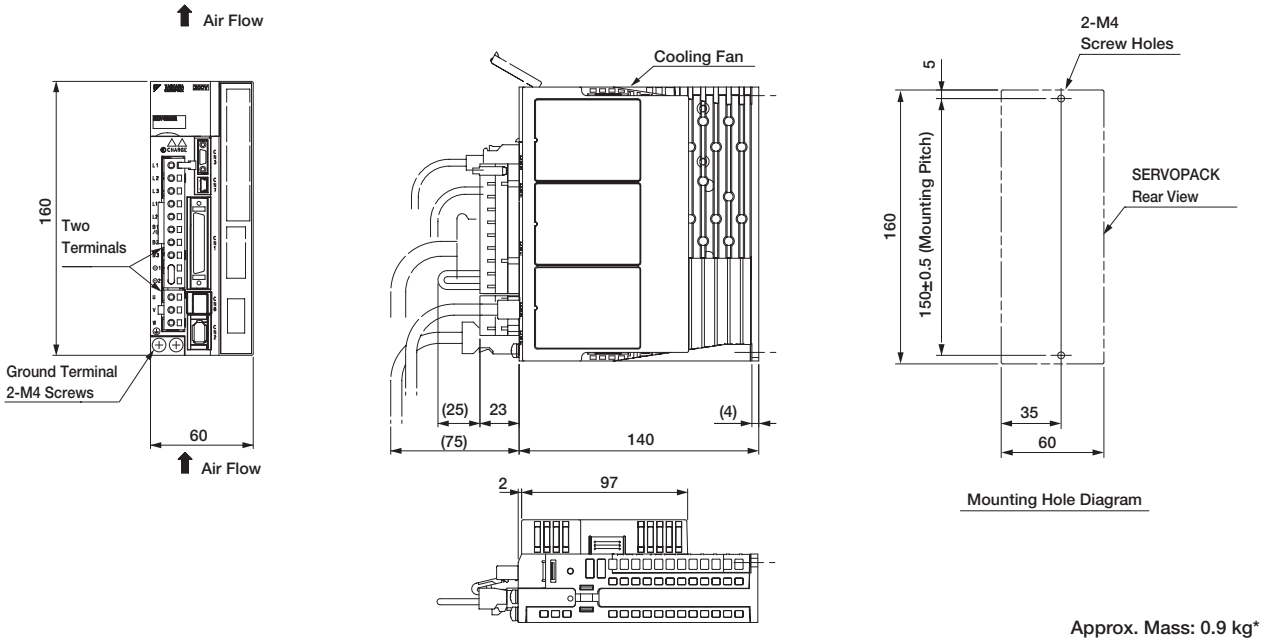
Approx. Mass: 1.5 kg*

*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

External Dimensions Units: mm (With Option Module)

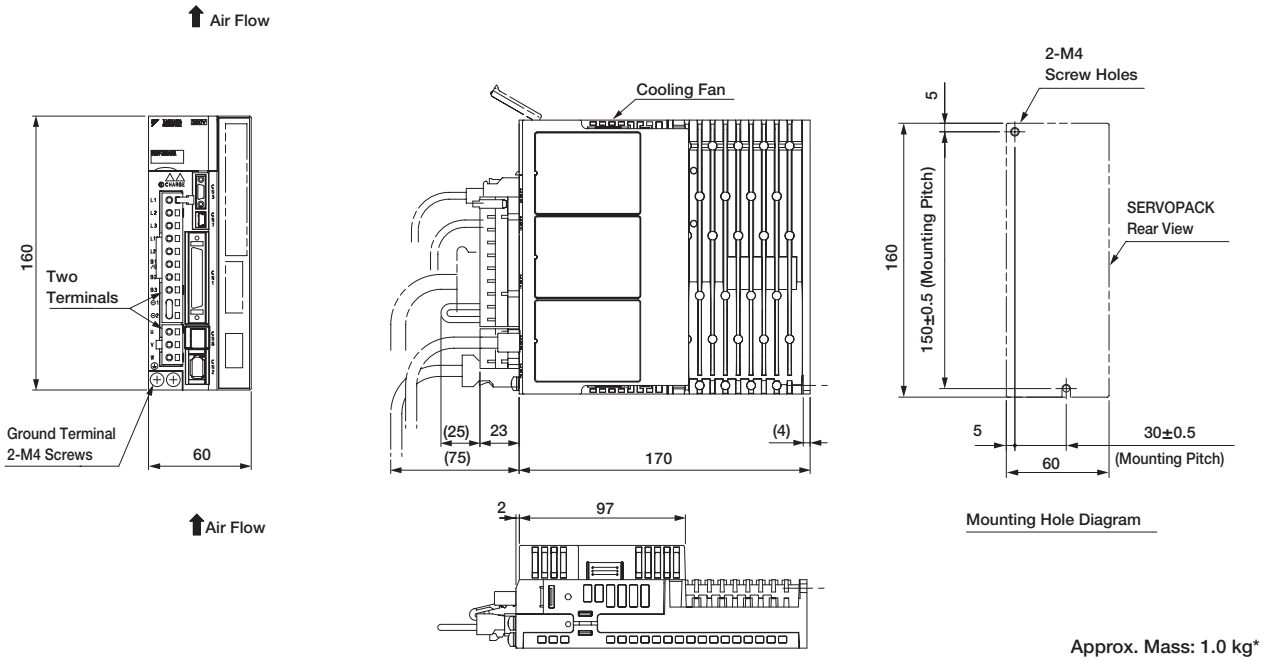
●Base-Mounted SERVOPACKs

(3) Three-phase 200 VAC,
Model: SGDVR70A□□A000000□□□, SGDVR90A□□A000000□□□, and SGDV1R6A□□A000000□□□



Approx. Mass: 0.9 kg*

(4) Three-phase 200 VAC, Model: SGDV2R8A□□A000000□□□

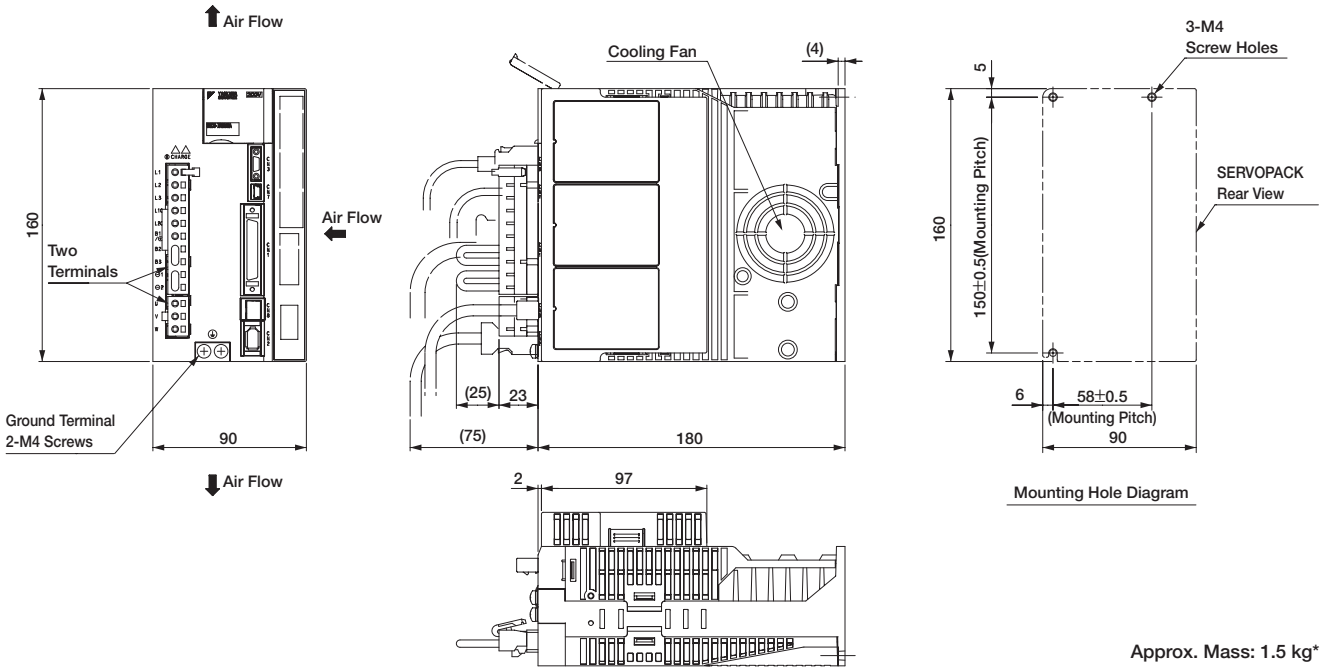


Approx. Mass: 1.0 kg*

*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

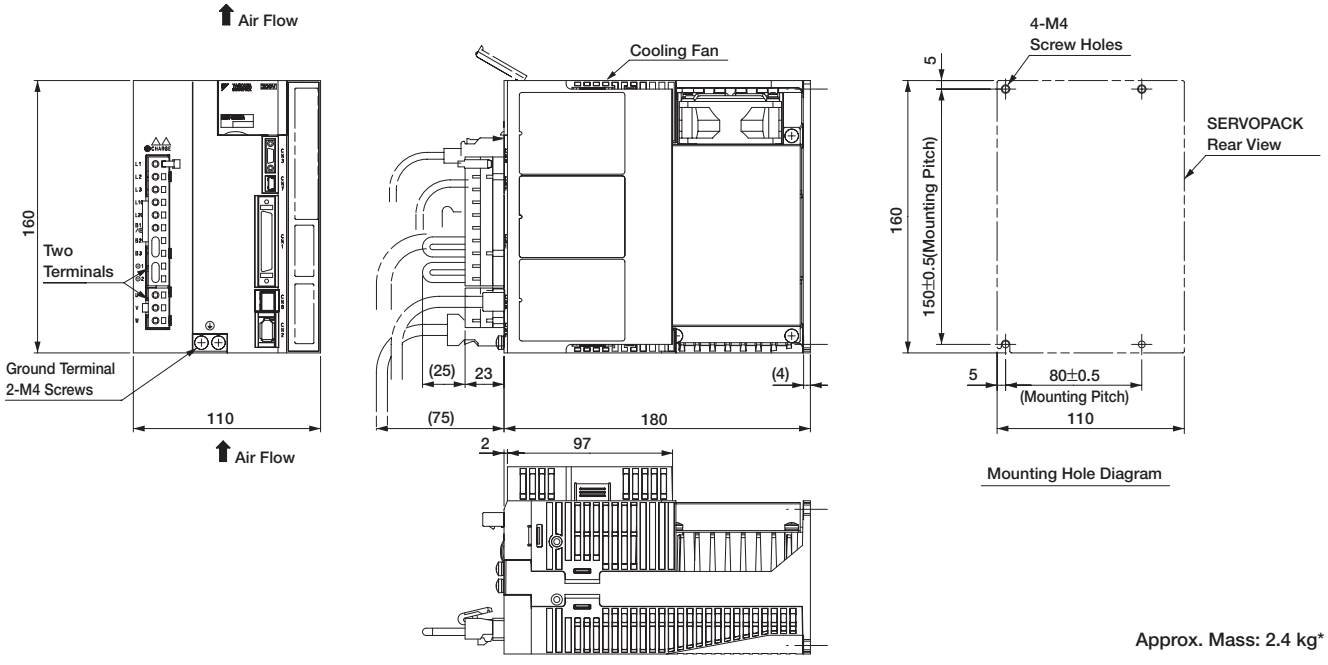
External Dimensions Units: mm (With Option Module)

(5) Three-phase 200 VAC,
Model: SGDV3R8A□□A000000□□□, SGDV5R5A□□A000000□□□, and SGDV7R6A□□A000000□□□



Approx. Mass: 1.5 kg*

(6) Three-phase 200 VAC, Model: SGDV120A□□A000000□□□



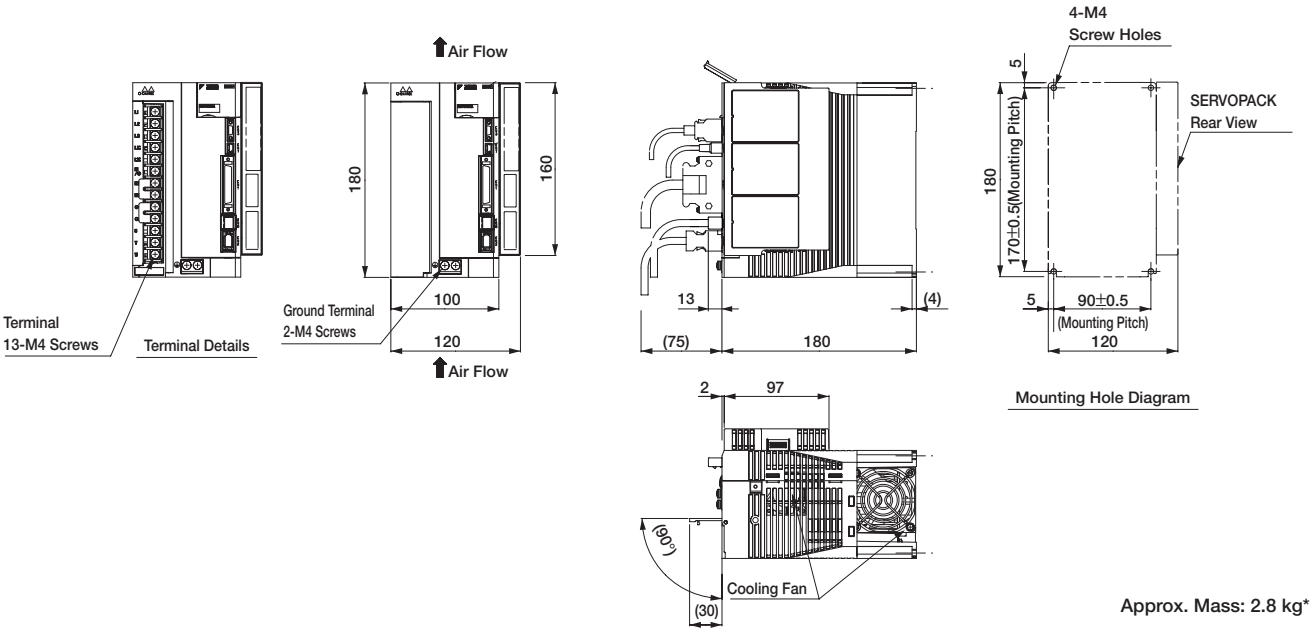
Approx. Mass: 2.4 kg*

*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

External Dimensions Units: mm (With Option Module)

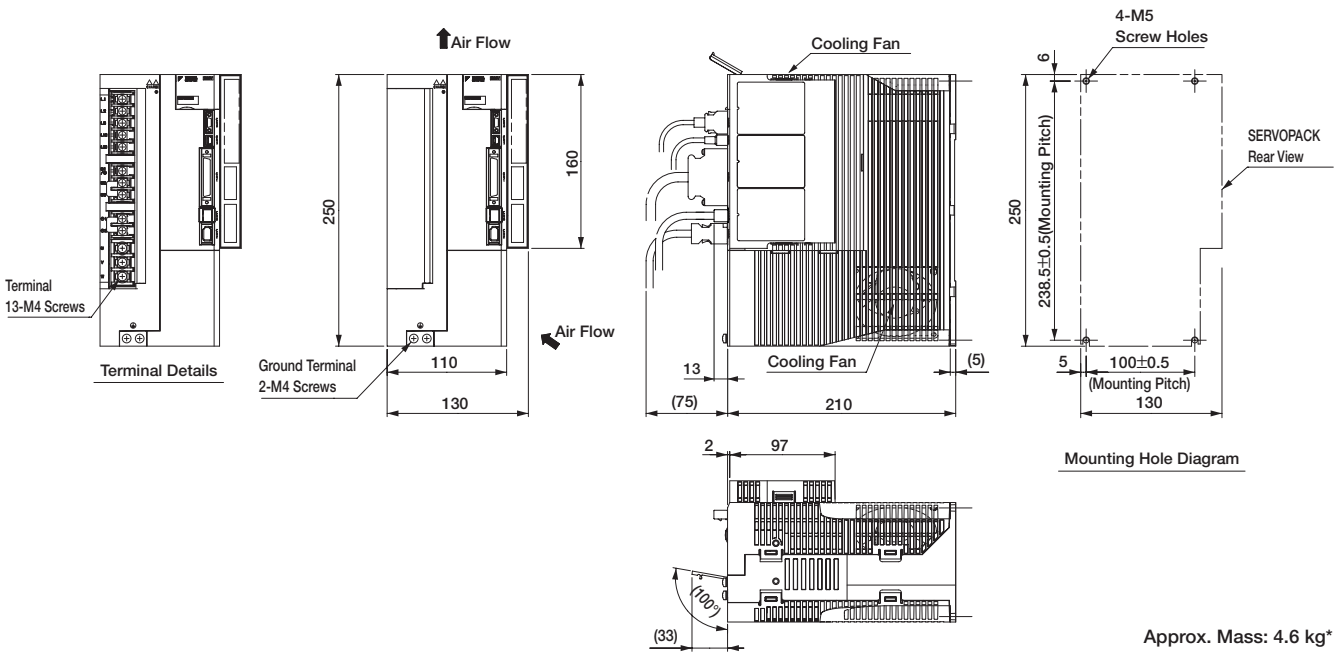
● Base-Mounted SERVOPACKs

(7) Single-phase 200 VAC, Model: SGDV120A□1A008000□□□ (1.5kW, single-phase input)
Three-phase 200 VAC, Model: SGDV180A□□A000000□□□ and SGDV200A□□A000000□□□



Approx. Mass: 2.8 kg*

(8) Three-phase 200 VAC, Model: SGDV330A□□A000000□□□

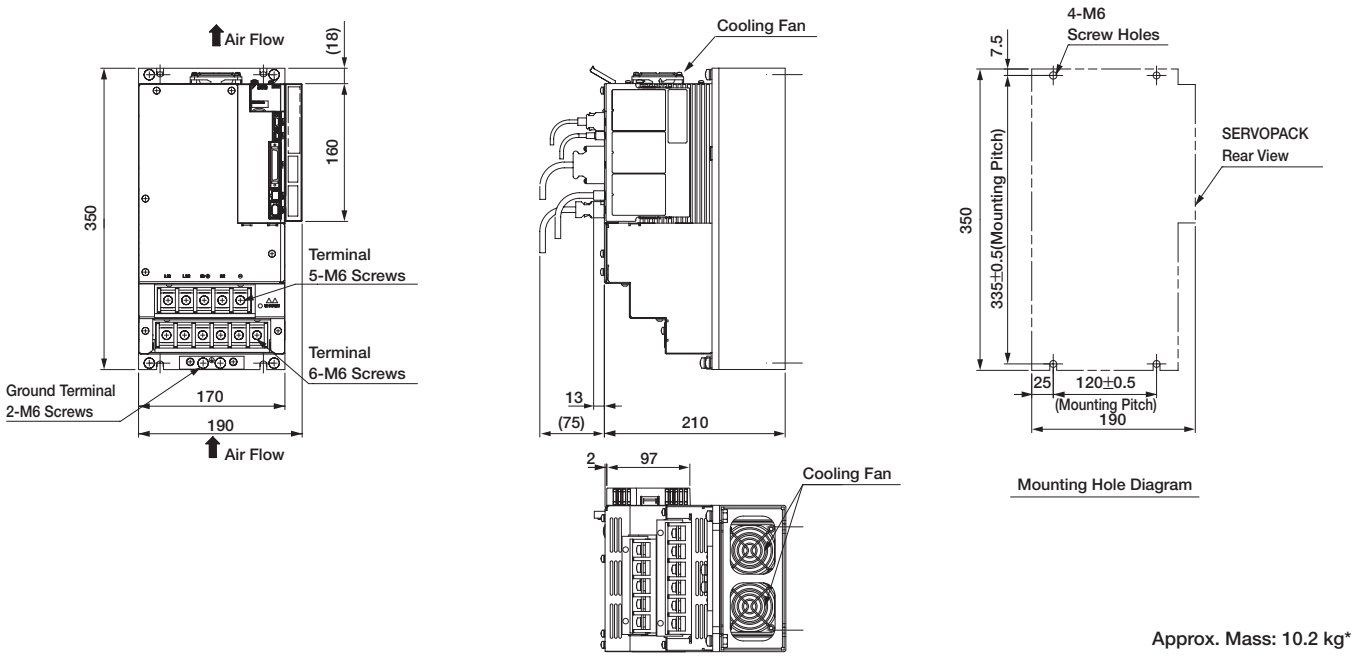


Approx. Mass: 4.6 kg*

*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

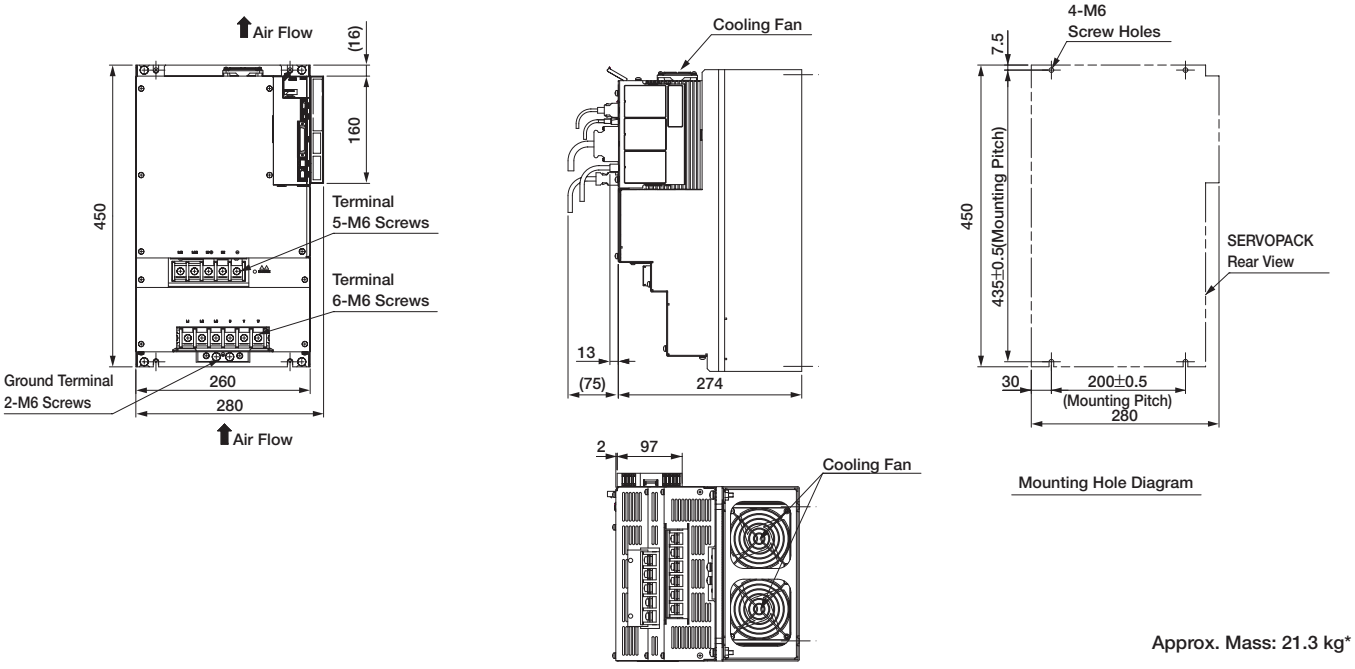
External Dimensions Units: mm (With Option Module)

(9) Three-phase 200 VAC, Model: SGDV470A□□A000000□□□ and SGDV550A□□A000000□□□



Approx. Mass: 10.2 kg*

(10) Three-phase 200 VAC, Model: SGDV590A□□A000000□□□ and SGDV780A□□A000000□□□



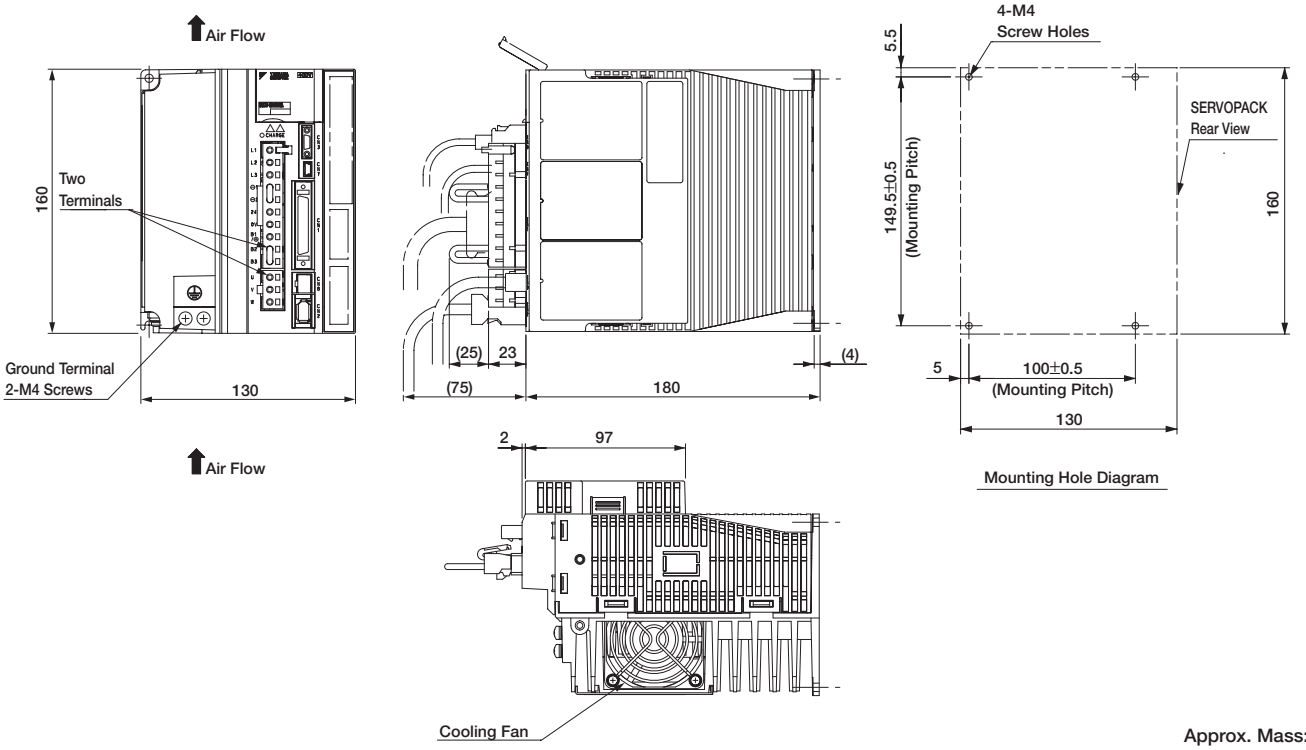
Approx. Mass: 21.3 kg*

*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

External Dimensions Units: mm (With Option Module)

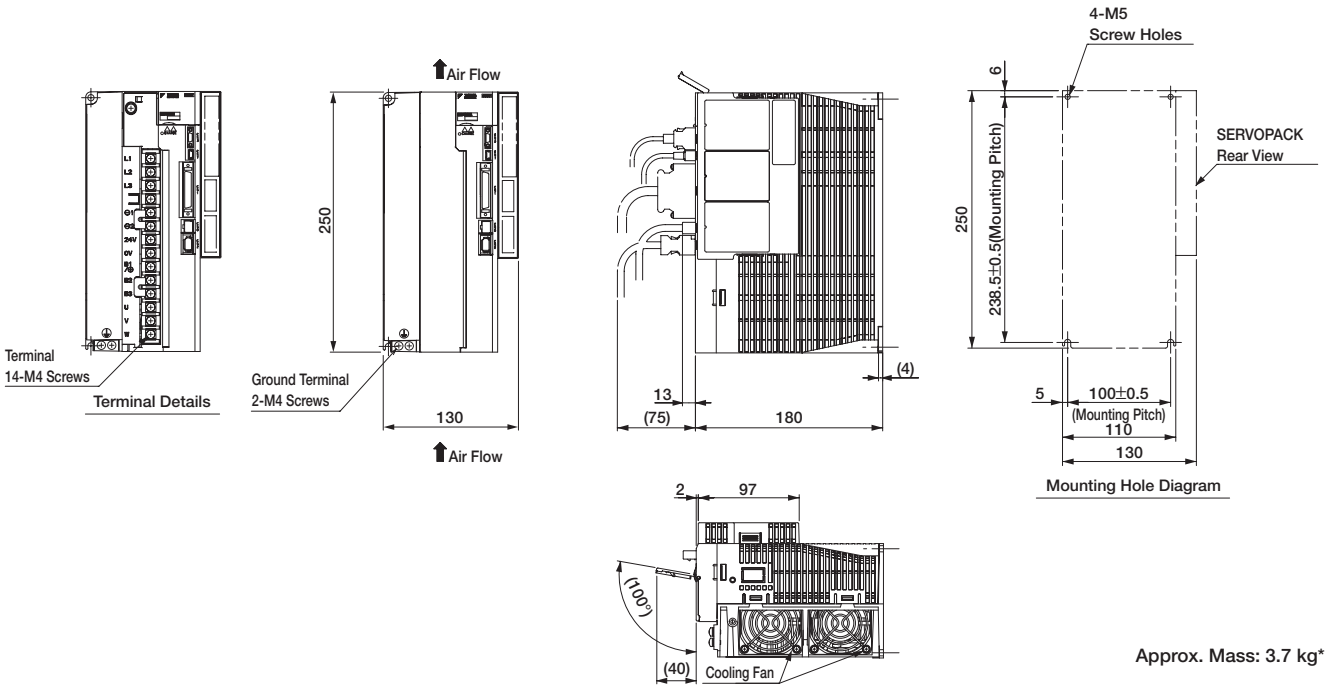
● Base-Mounted SERVOPACKs

(11) Three-phase 400 VAC,
Model: SGDV1R9D□□A000000□□□, SGDV3R5D□□A000000□□□, and SGDV5R4D□□A000000□□□



Approx. Mass: 2.7 kg*

(12) Three-phase 400 VAC, Model: SGDV8R4D□□A000000□□□ and SGDV120D□□A000000□□□

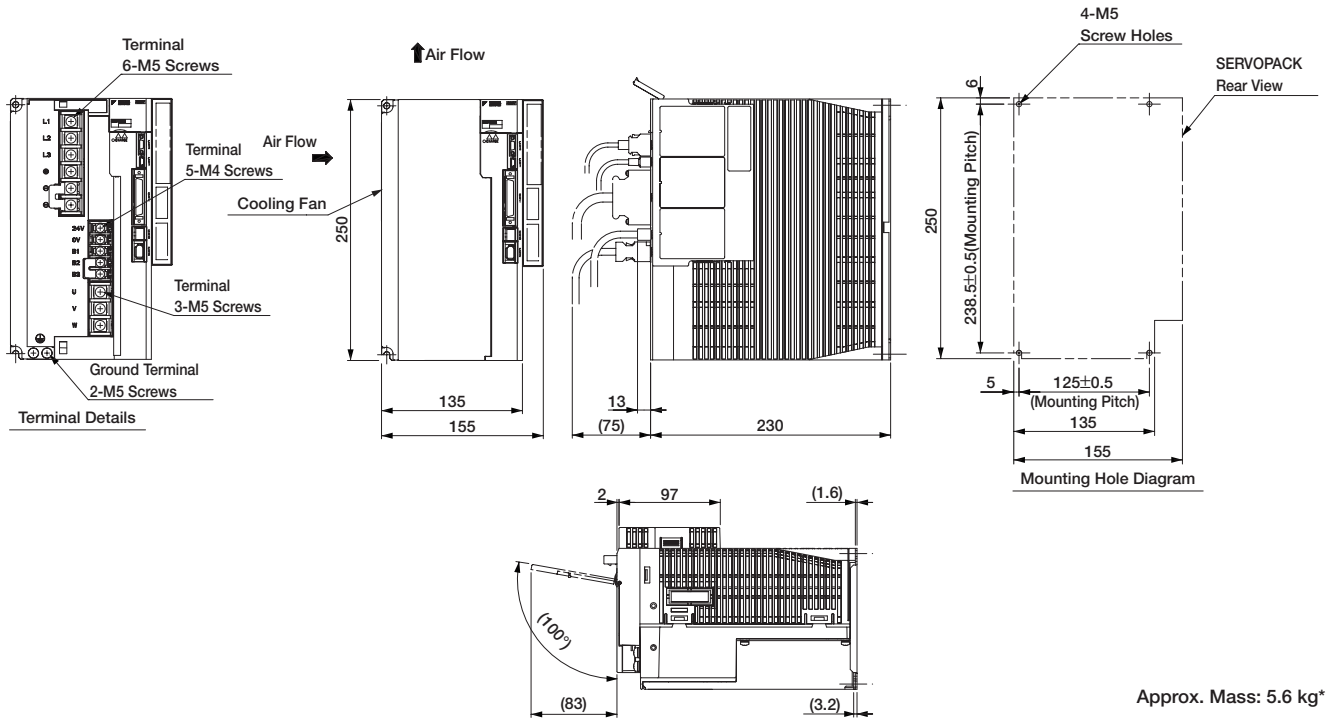


Approx. Mass: 3.7 kg*

*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

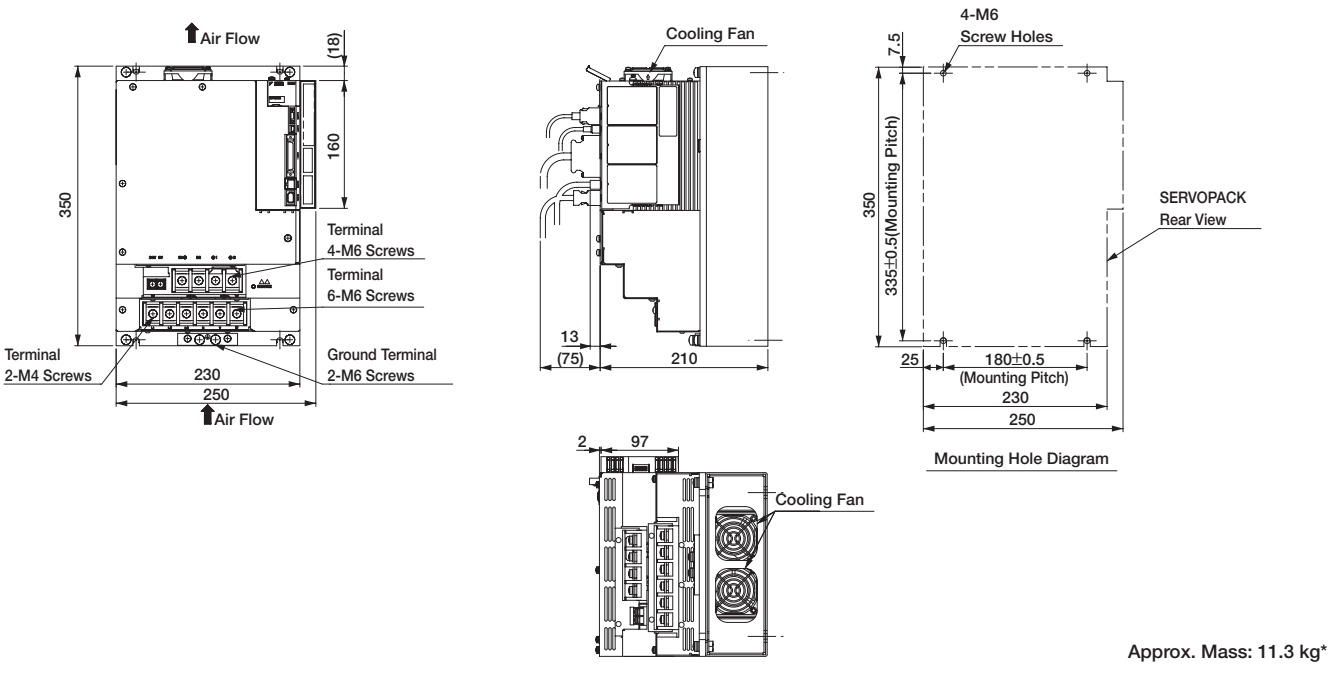
External Dimensions Units: mm (With Option Module)

(13) Three-phase 400 VAC, Model: SGDV170D□□A000000□□□



Approx. Mass: 5.6 kg*

(14) Three-phase 400 VAC, Model: SGDV210D□□A000000□□□ and SGDV260D□□A000000□□□



Approx. Mass: 11.3 kg*

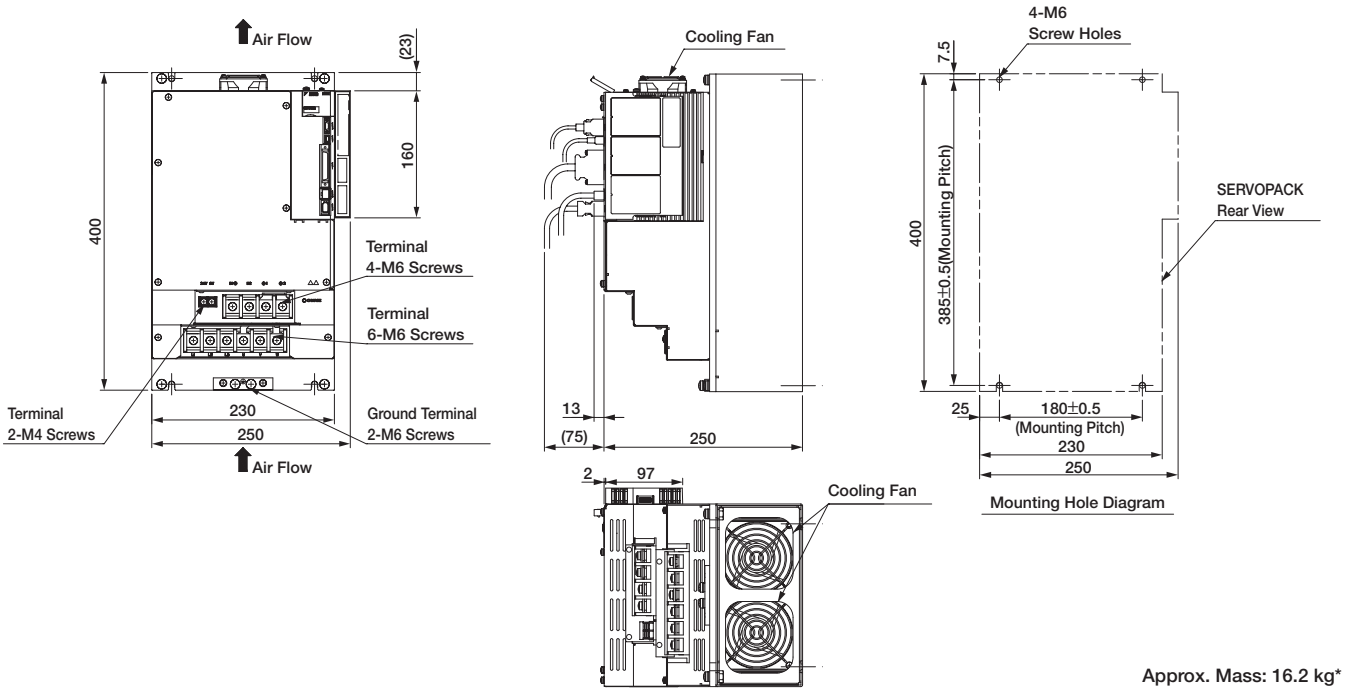
*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

SERVOPACK External Dimensions

External Dimensions Units: mm (With Option Module)

● Base-Mounted SERVOPACKs

(15) Three-phase 400 VAC, Model: SGDV280D□□A000000□□□ and SGDV370D□□A000000□□□



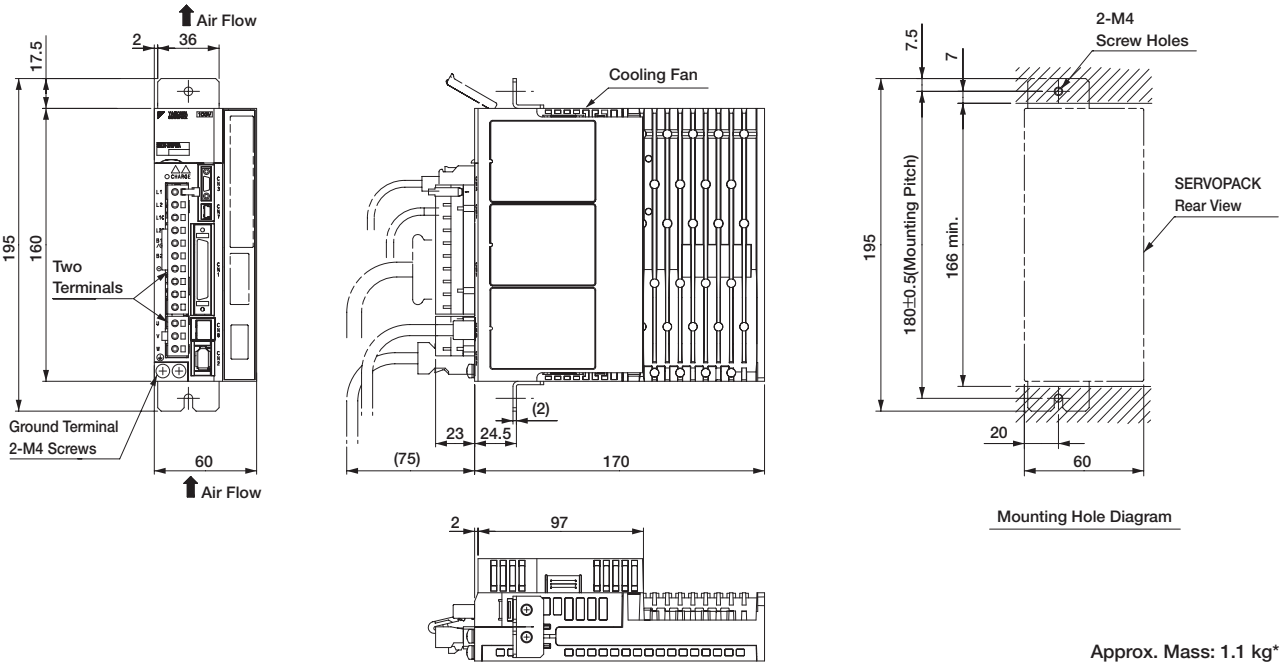
Approx. Mass: 16.2 kg*

*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

External Dimensions Units: mm (With Option Module)

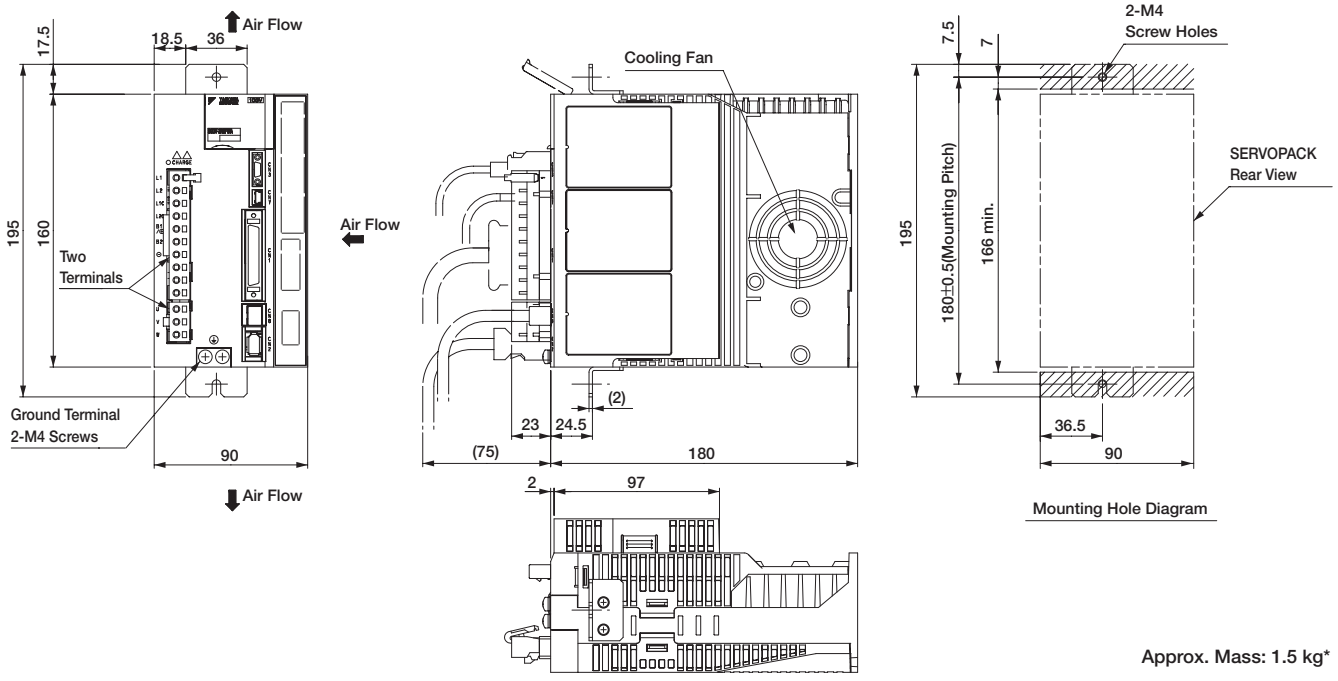
● Rack-mounted SERVOPACKs (6 kW or more models: duct-ventilated)

(1) Single-phase 100 VAC,
Model: SGDVR70F□□A001000□□□, SGDVR90F□□A001000□□□, and SGDV2R1F□□A001000□□□



Approx. Mass: 1.1 kg*

(2) Single-phase 100 VAC, Model: SGDV2R8F□□A001000□□□



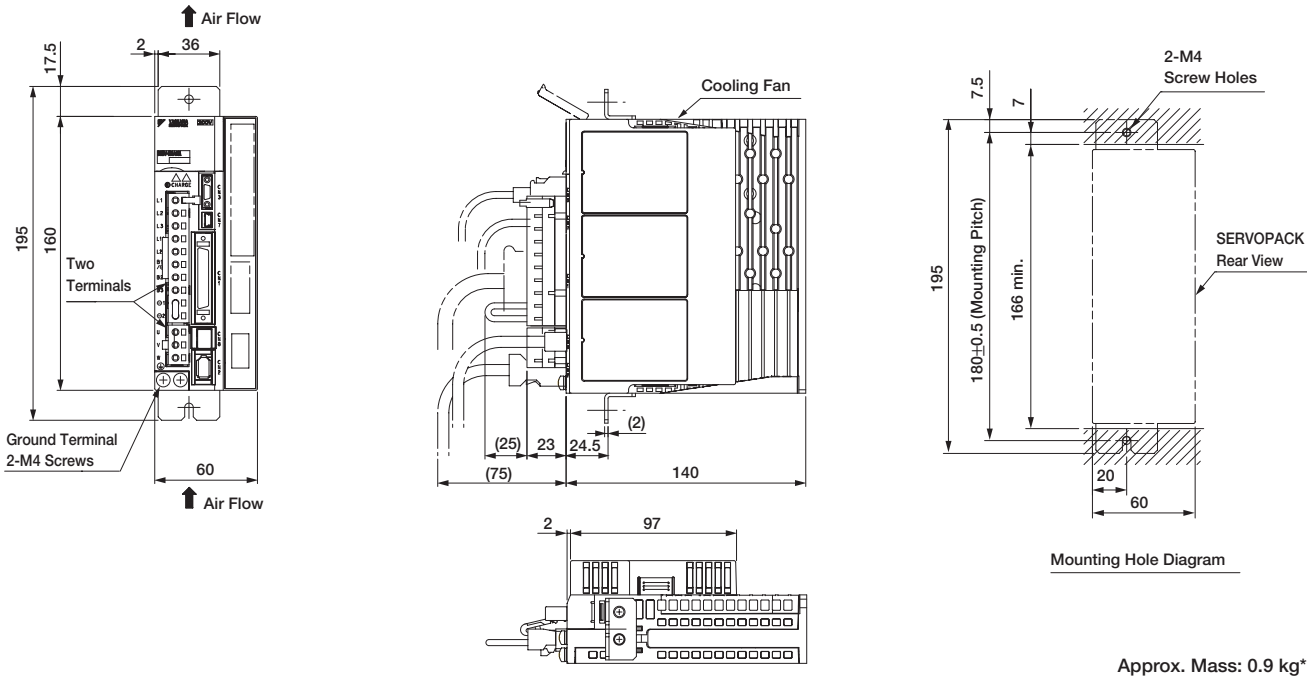
Approx. Mass: 1.5 kg*

*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

External Dimensions Units: mm (With Option Module)

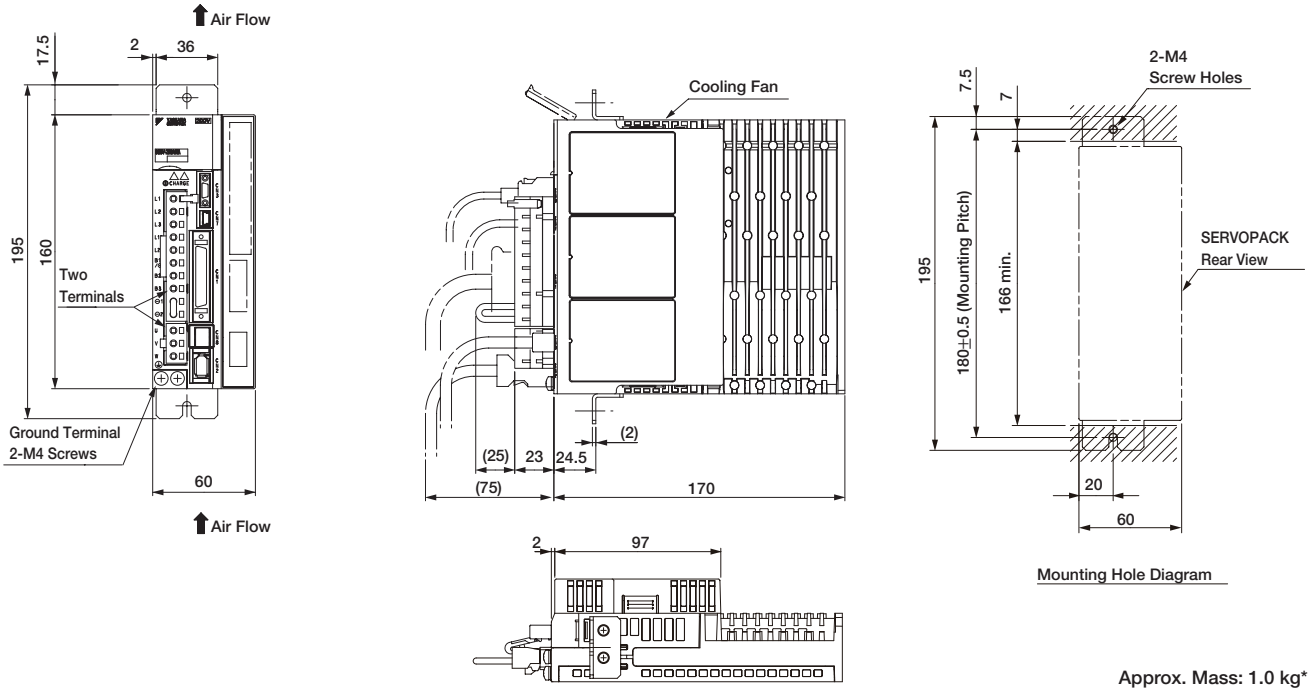
● Rack-mounted SERVOPACKs (6 kW or more models: duct-ventilated)

(3) Three-phase 200 VAC,
Model: SGDVR70A□□A001000□□□, SGDVR90A□□A001000□□□, and SGDV1R6A□□A001000□□□



Approx. Mass: 0.9 kg*

(4) Three-phase 200 VAC, Model: SGDV2R8A□□A001000□□□

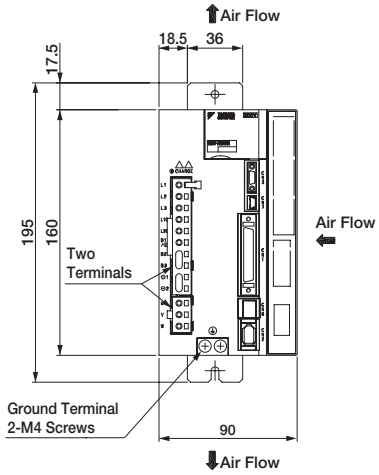


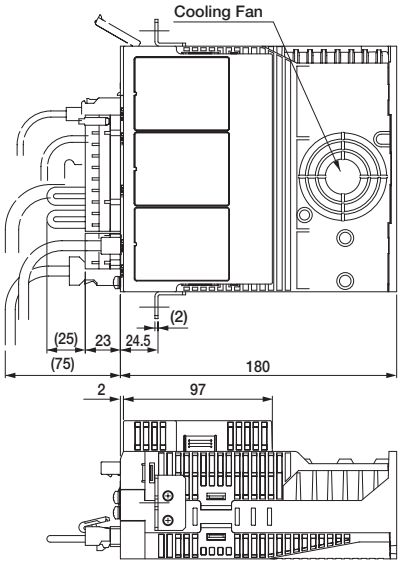
Approx. Mass: 1.0 kg*

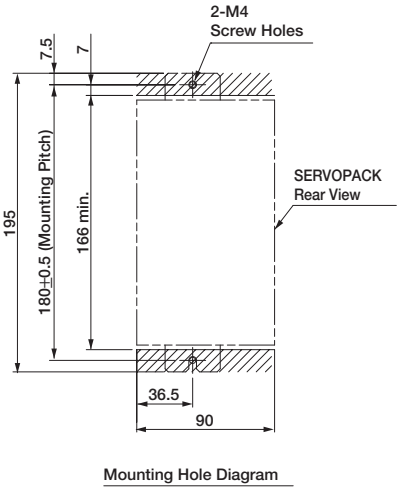
*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

External Dimensions Units: mm (With Option Module)

(5) Three-phase 200 VAC, Model: SGDV3R8A□□A001000□□□, SGDV5R5A□□A001000□□□, and SGDV7R6A□□A001000□□□



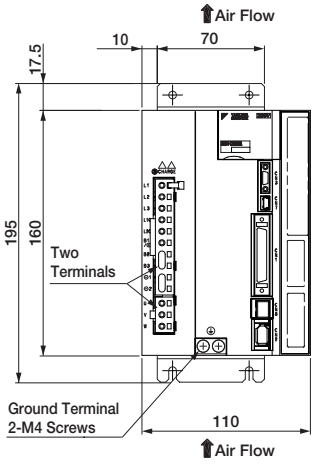


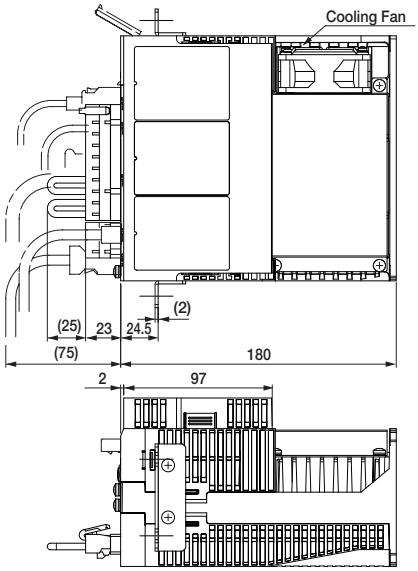


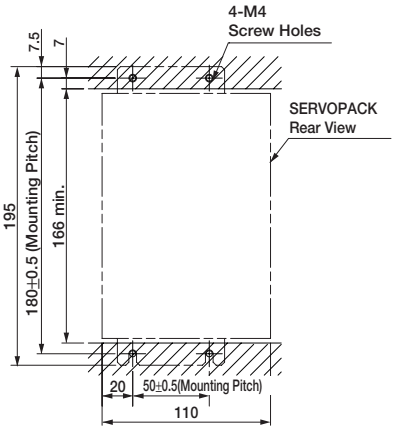
Mounting Hole Diagram

Approx. Mass: 1.5 kg*

(6) Three-phase 200 VAC, Model: SGDV120A□□A001000□□□







Mounting Hole Diagram

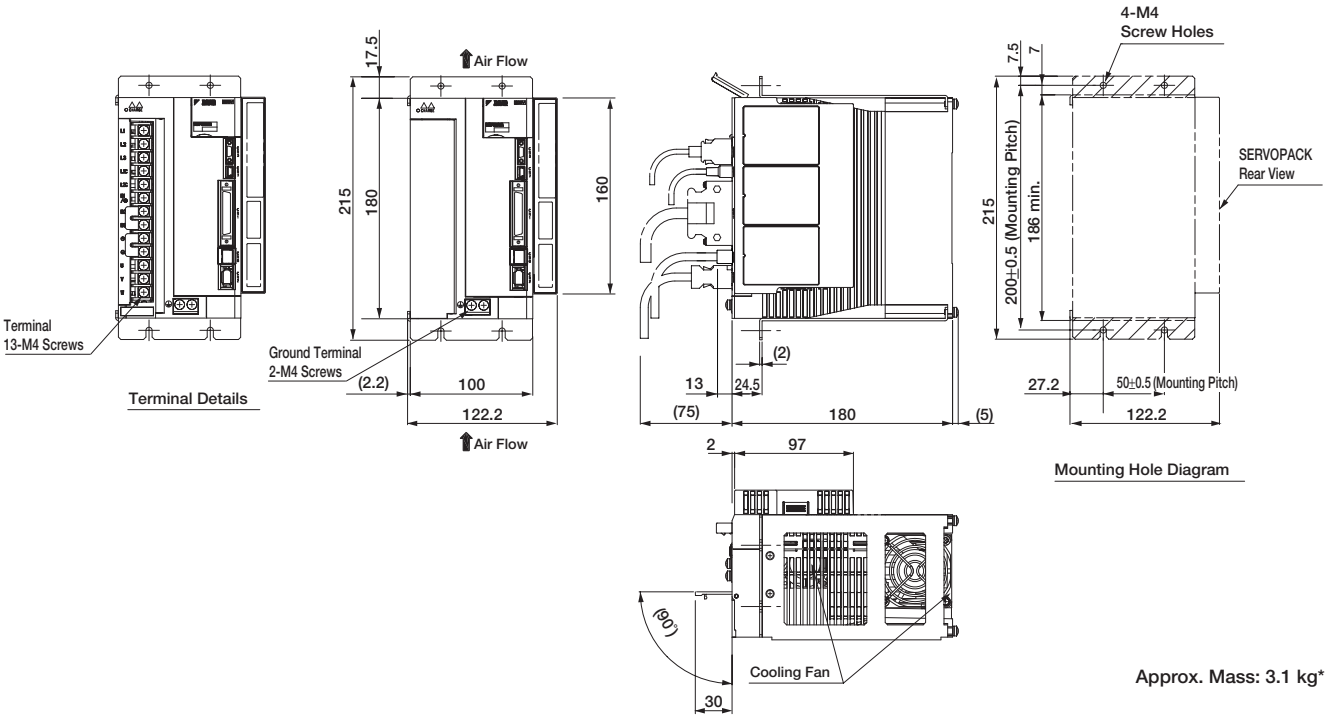
Approx. Mass: 2.5 kg*

*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

External Dimensions Units: mm (With Option Module)

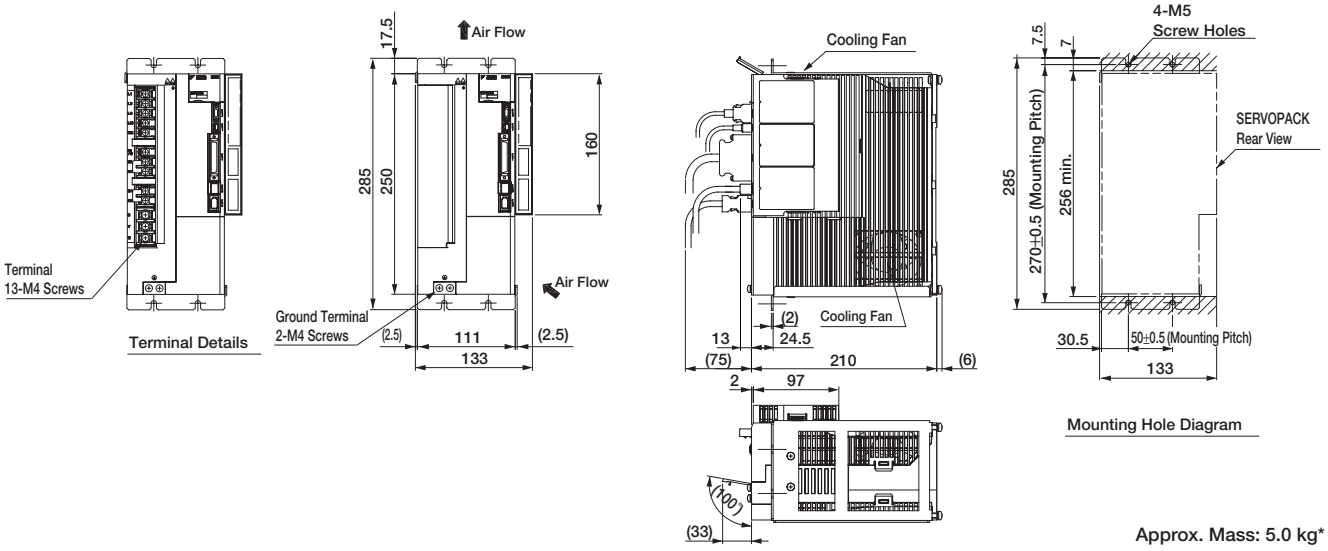
● Rack-mounted SERVOPACKs (6 kW or more models: duct-ventilated)

(7) Three-phase 200 VAC, Model: SGDV180A□□A001000□□□ and SGDV200A□□A001000□□□



Approx. Mass: 3.1 kg*

(8) Three-phase 200 VAC, Model: SGDV330A□□A001000□□□

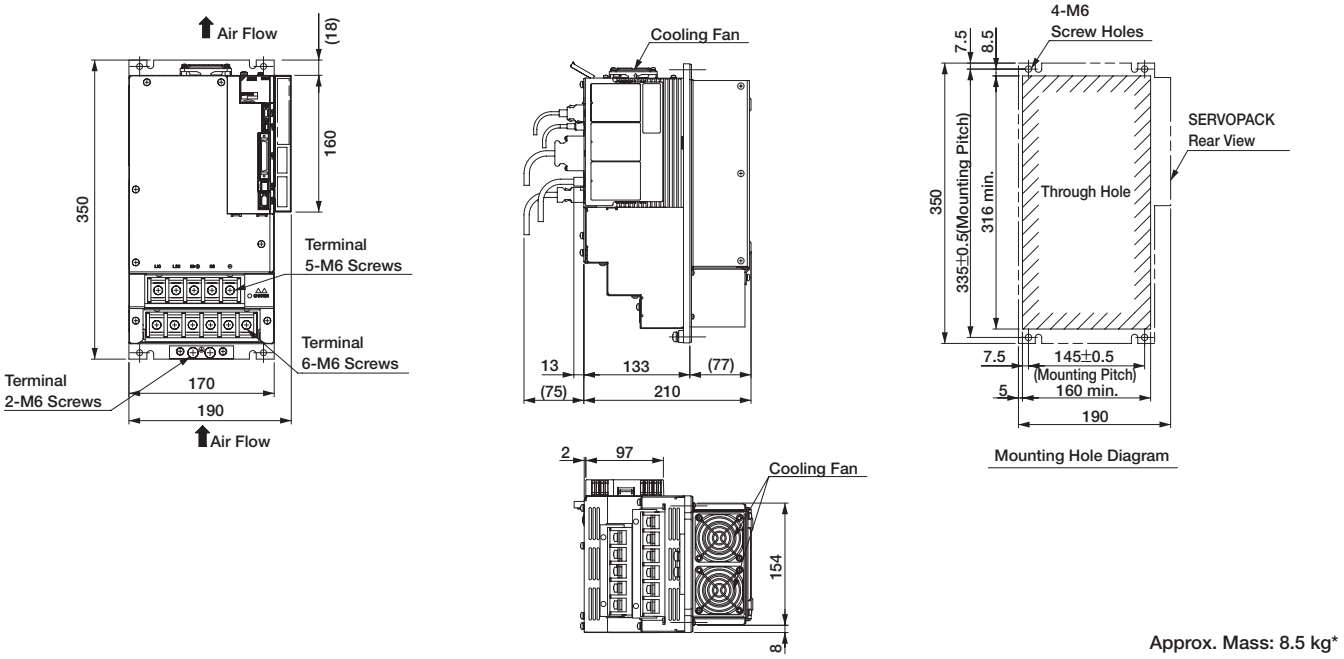


Approx. Mass: 5.0 kg*

*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

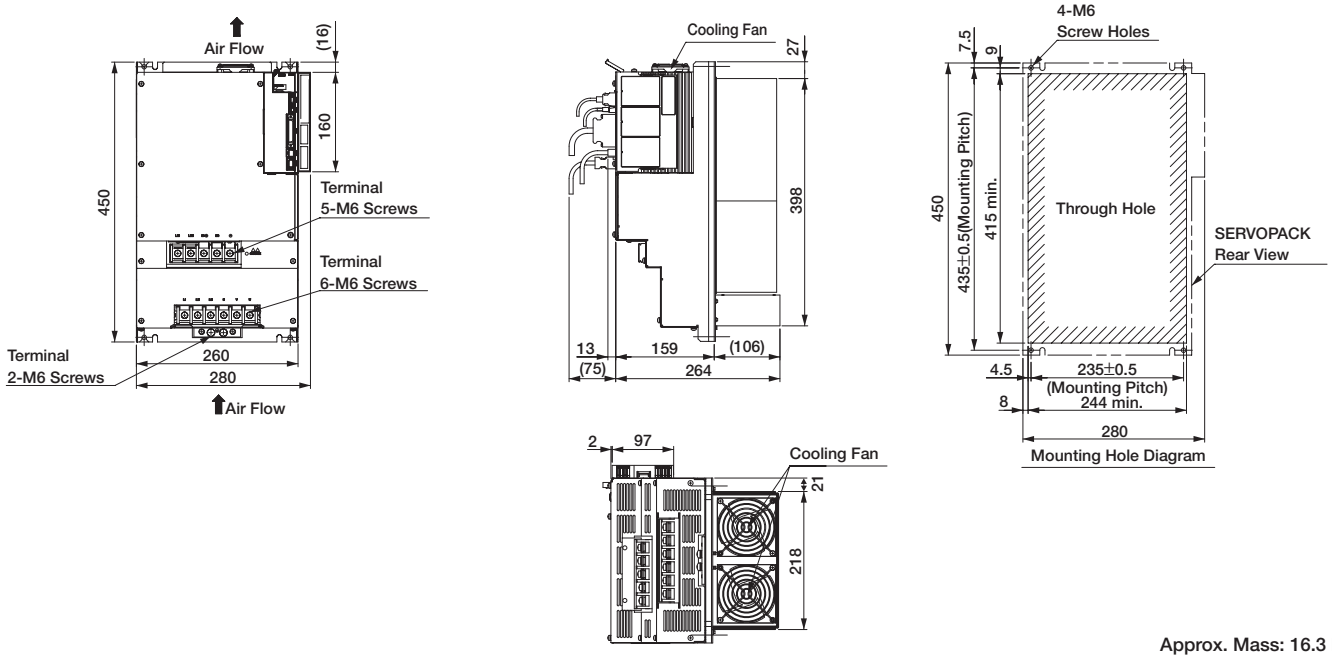
External Dimensions Units: mm (With Option Module)

(9) Three-phase 200 VAC, Model: SGDV470A□□A001000□□□ and SGDV550A□□A001000□□□ (duct-ventilated)



Approx. Mass: 8.5 kg*

(10) Three-phase 200 VAC, Model: SGDV590A□□A001000□□□ and SGDV780A□□A001000□□□ (duct-ventilated)



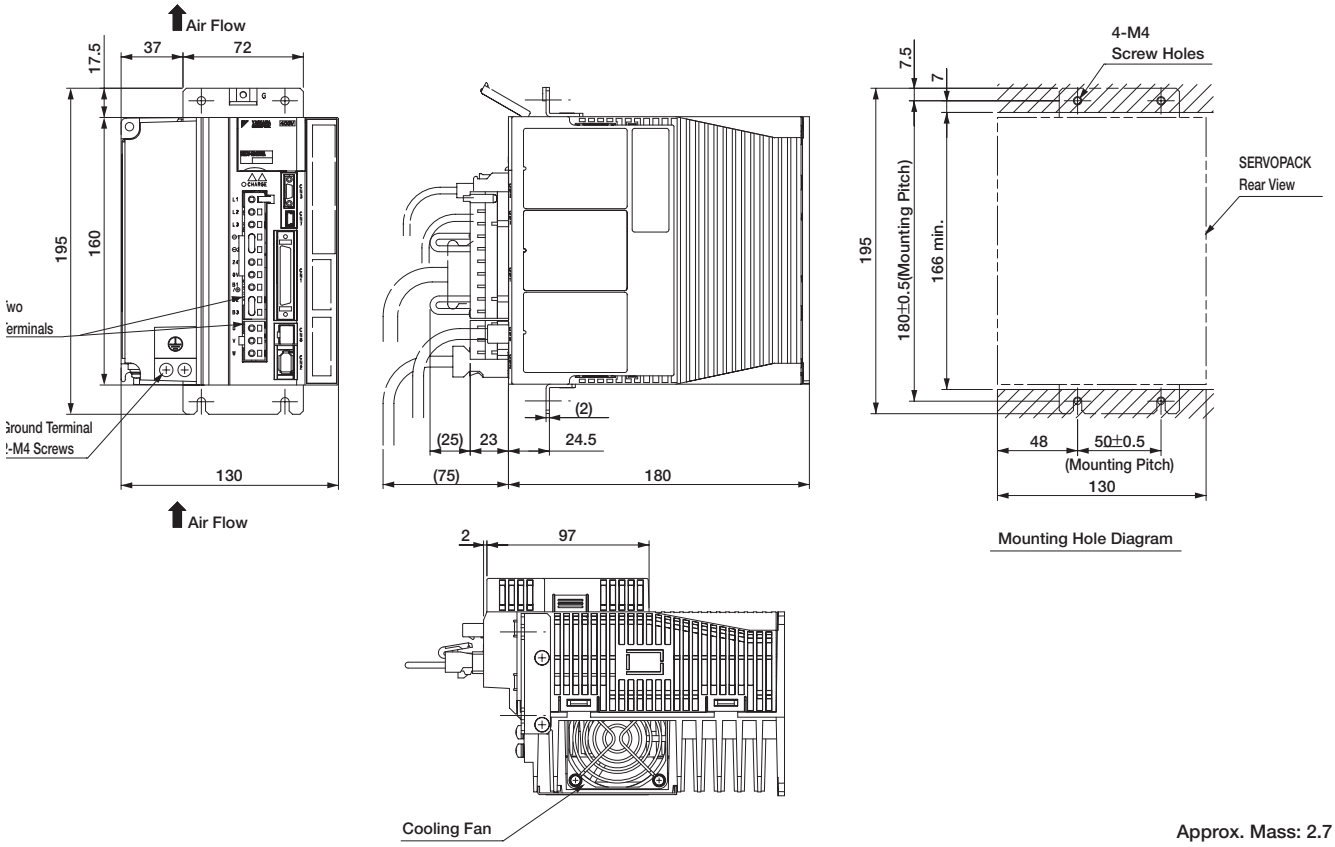
Approx. Mass: 16.3 kg*

*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

External Dimensions Units: mm (With Option Module)

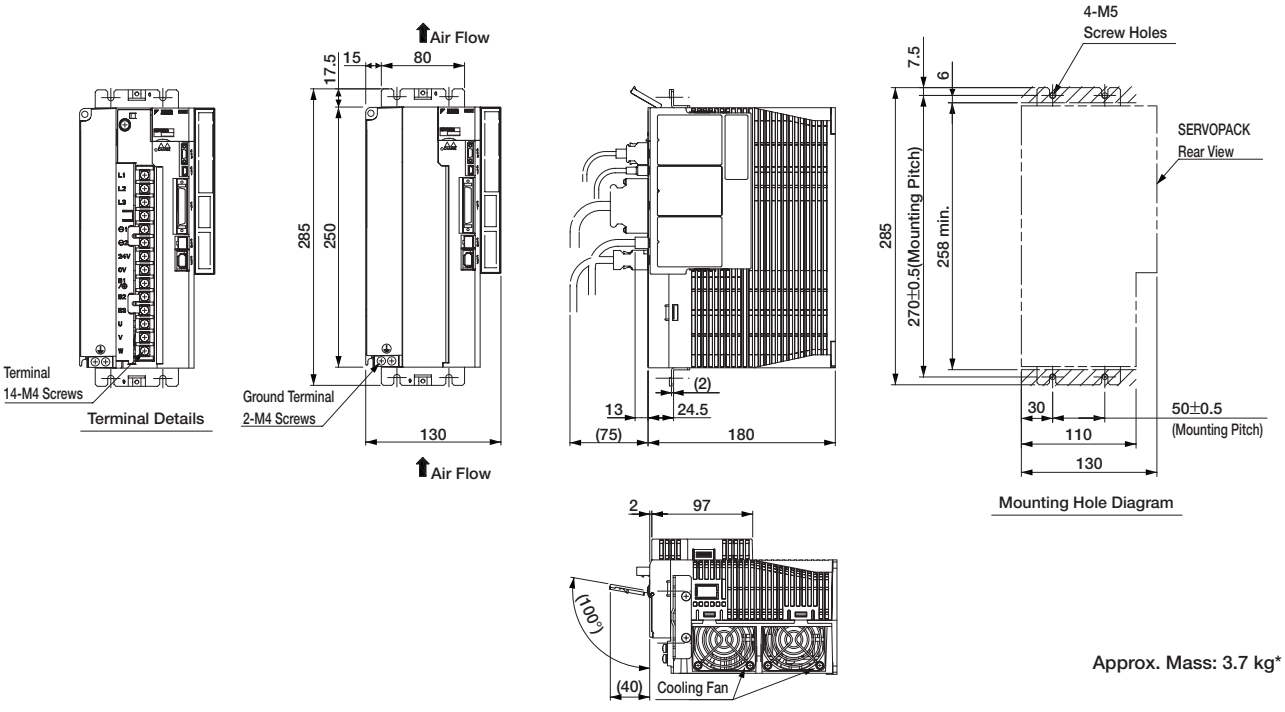
● Rack-mounted SERVOPACKs (6 kW or more models: duct-ventilated)

(11) Three-phase 400 VAC,
Model: SGDV1R9D□□A001000□□□, SGDV3R5D□□A001000□□□, and SGDV5R4D□□A001000□□□



Approx. Mass: 2.7 kg*

(12) Three-phase 400 VAC, Model: SGDV8R4D□□A001000□□□ and SGDV120D□□A001000□□□

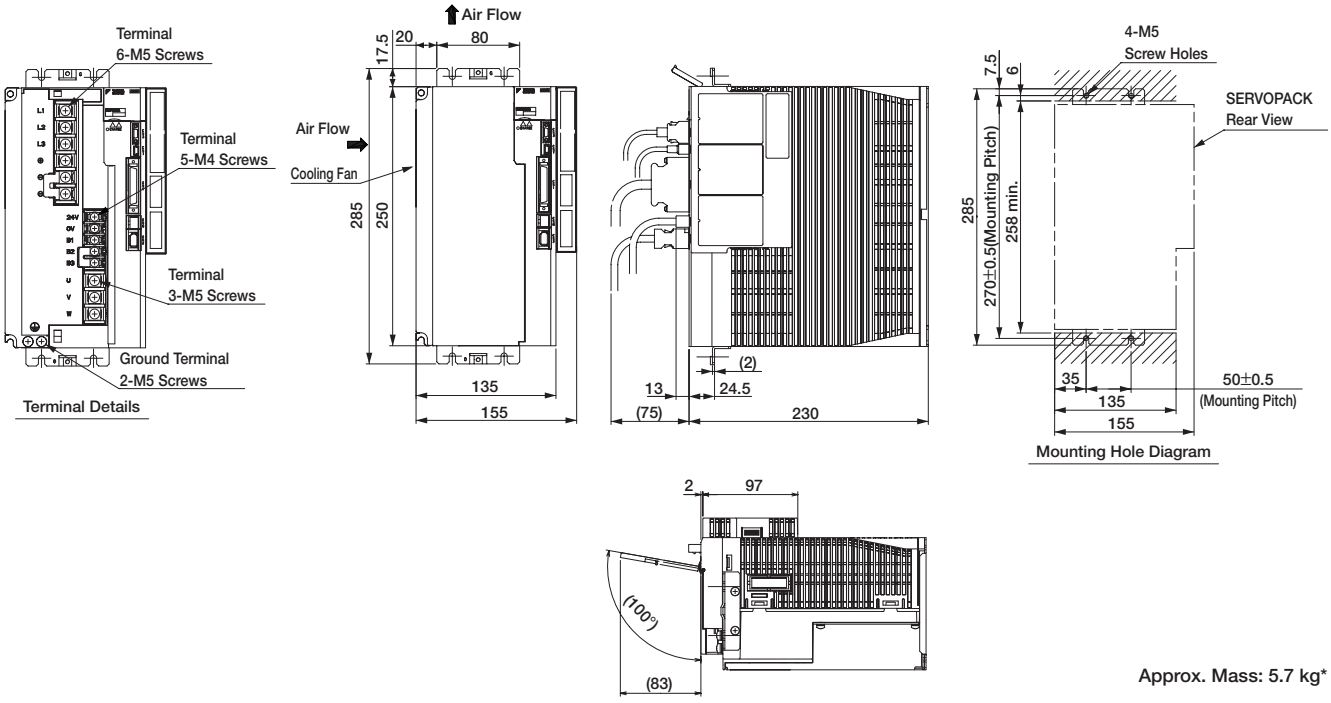


Approx. Mass: 3.7 kg*

*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

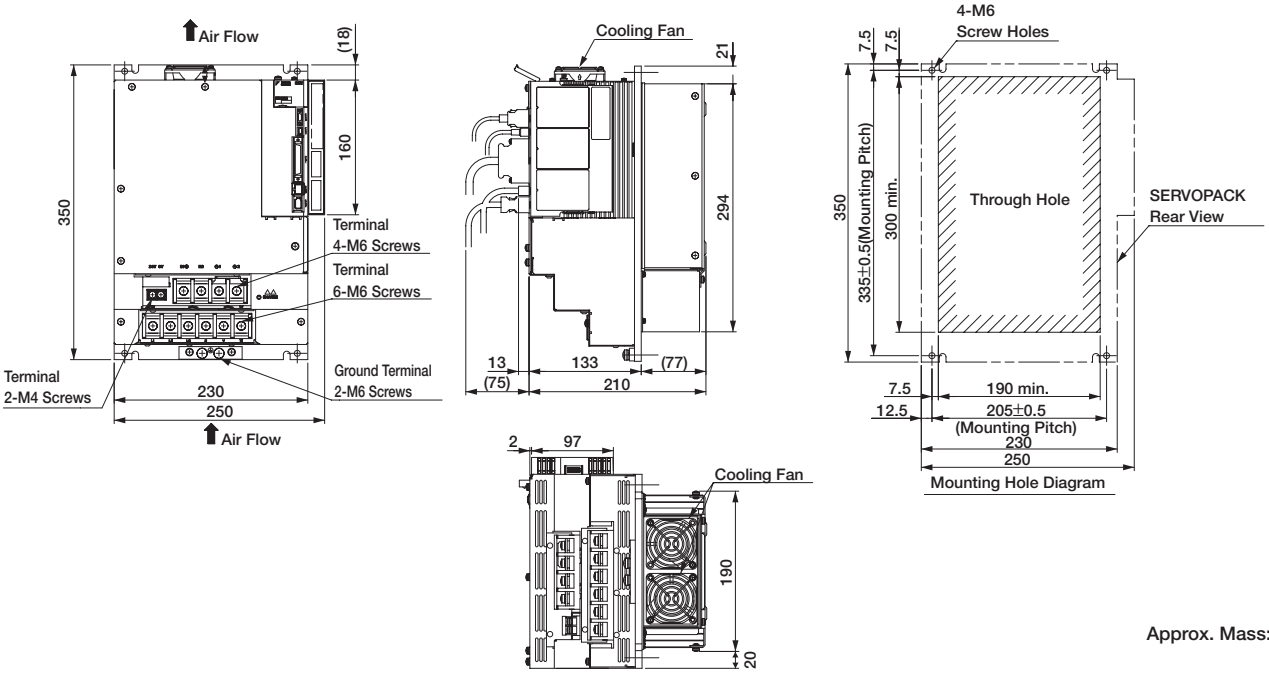
External Dimensions Units: mm (With Option Module)

(13) Three-phase 400 VAC, Model: SGDV170D□□A001000□□□



Approx. Mass: 5.7 kg*

(14) Three-phase 400 VAC, Model: SGDV210D□□A001000□□□ and SGDV260D□□A001000□□□ (duct-ventilated)



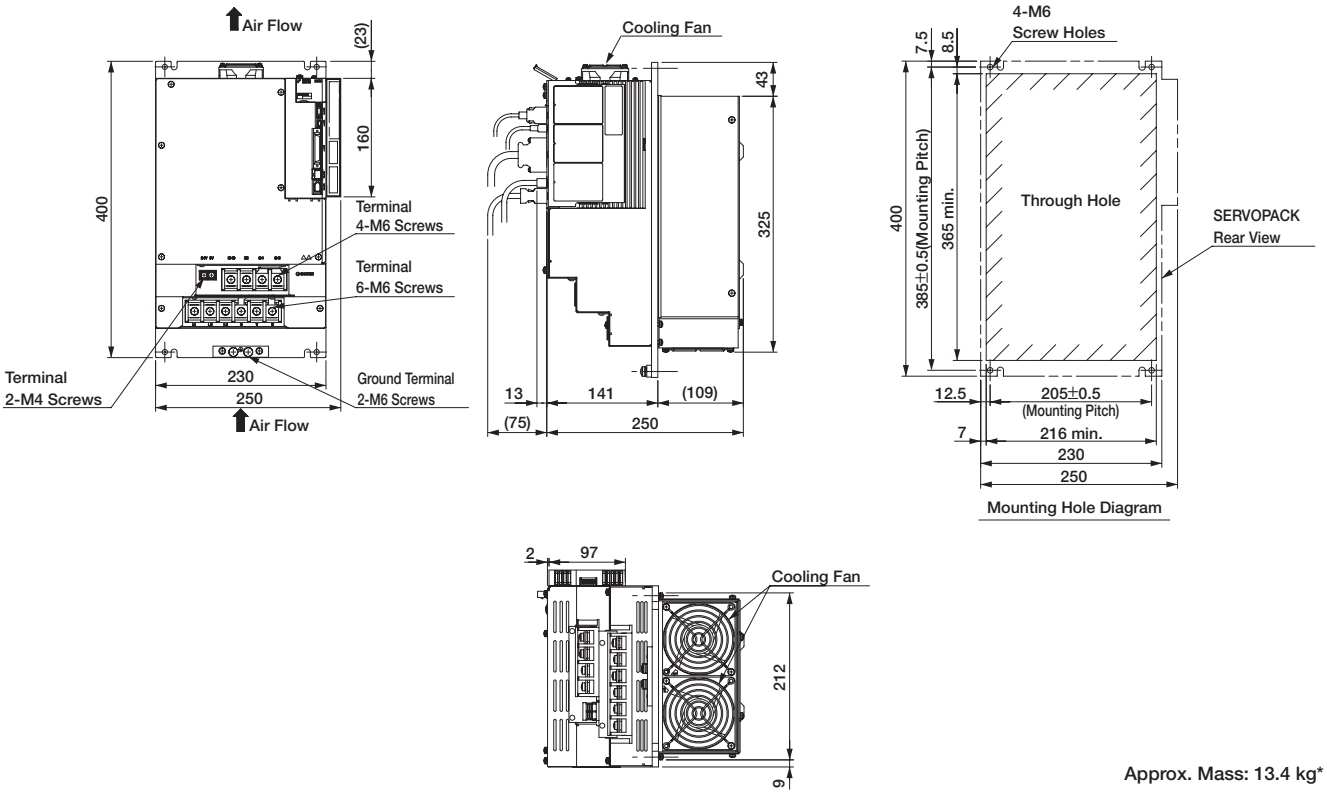
Approx. Mass: 8.1 kg*

*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

External Dimensions Units: mm (With Option Module)

● Rack-mounted SERVOPACKs (6 kW or more models: duct-ventilated)

(15) Three-phase 400 VAC, Model: SGDV280D□□A001000□□□ and SGDV370D□□A001000□□□ (duct-ventilated)



Approx. Mass: 13.4 kg*

*: Approx. mass of option modules are not included in this value.
Approx. mass of option modules are as follows.
- INDEXER Module: 0.2 kg
- Fully-closed Module: 0.1 kg

Option Module for EtherCAT (CoE) Communication Reference

● System Configuration for EtherCAT (CoE) Communication Reference

Features

The EtherCAT (CoE) Network Module implements the CANopen drive profile (CiA402) in EtherCAT communication (real-time Ethernet communication).

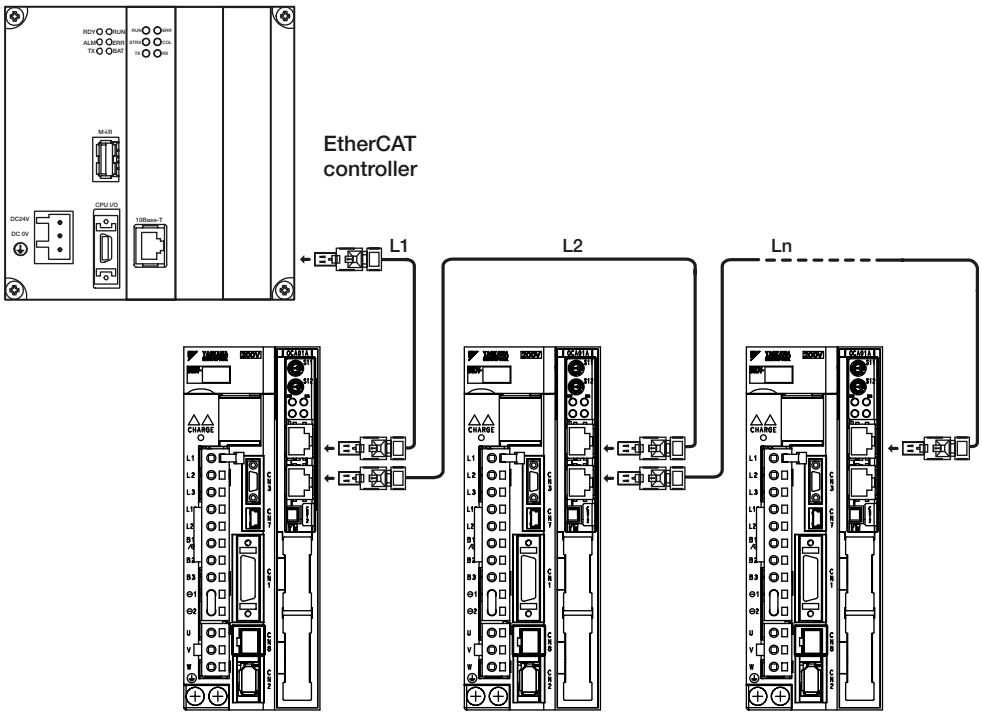
● Topology

Flexible topologies enable the application for various system architectures, such as cascade connection, line connection, star connection, and ring connection.

● Synchronization Control

The Distributed Clock of the EtherCAT synchronizes the controller and the SERVOPACK. (Synchronization jitter between servo axes: 1 μs or less)

Note: EtherCAT is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.



Model Designation

SGDV – OC A01 A

Series	
SGDV	Σ-V Series

1st + 2nd digits: Module Type	
Code	Module
OC	Command option module

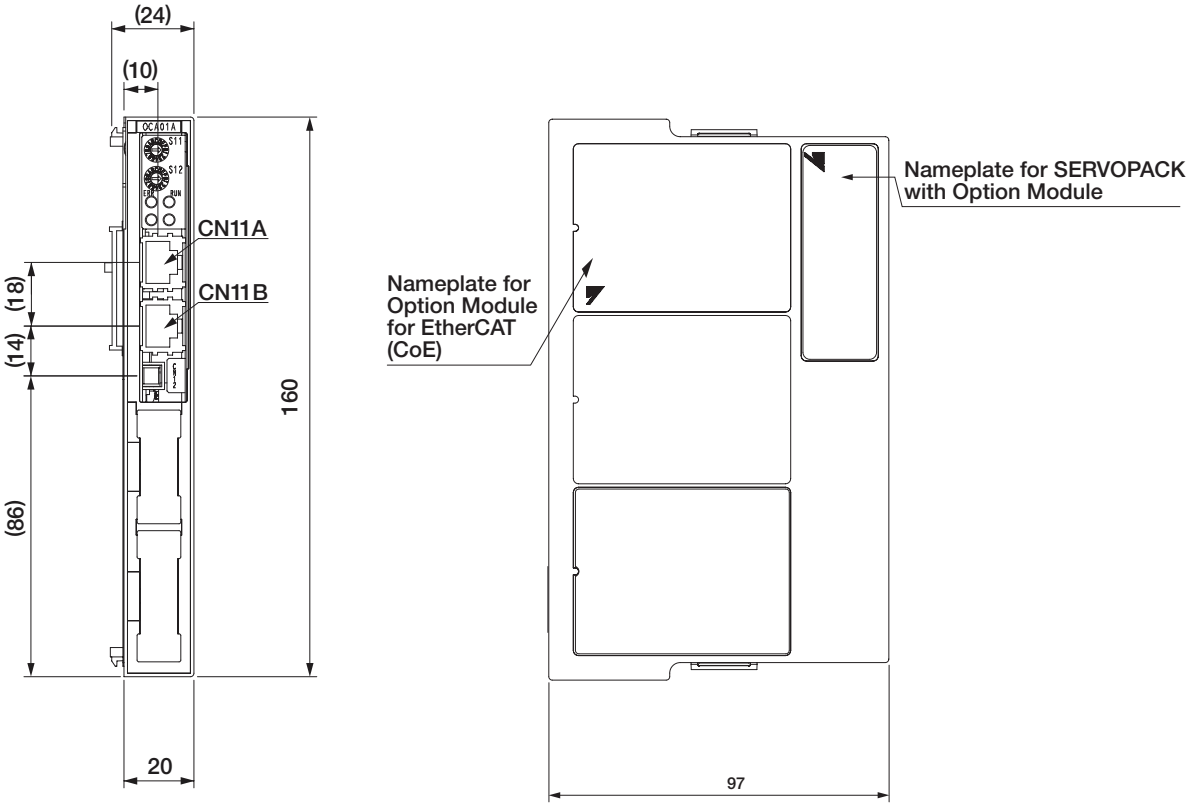
6th digit: Design Revision Order

3rd + 4th + 5th digits: Interface Specifications	
Code	Interface
A01	EtherCAT (CoE)

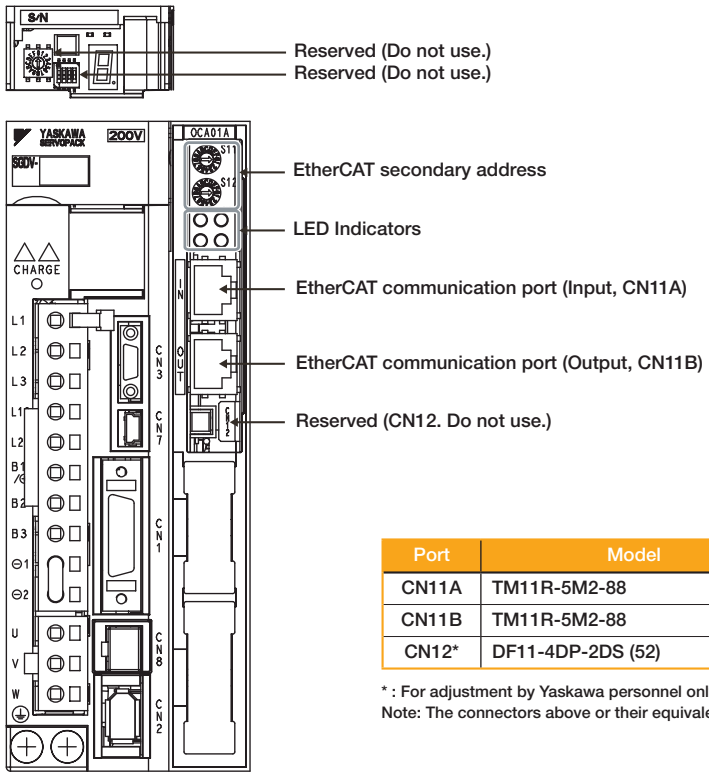
NOTE: Mounting of Option Modules on Amplifiers with Interface Option E1 and E5 requires mounting kit SGDV-OZA01A (metal bar, mounting screws and cover).

Option Module for EtherCAT (CoE)

●External Dimensions Units: mm



Approx. Mass: 0.1 kg



Front View: With front cover open

EtherCAT Connector (RJ45)

Connector	Description
CN11A	EtherCAT signal input
CN11B	EtherCAT signal output

- Connector Pin Arrangement

Pin No.	Signal Name	Remarks
1	TD+	Send data
2	TD-	
3	RD+	Receive data
4	–	N.C.*
5	–	N.C.*
6	RD-	Receive data
7	–	N.C.*
8	–	N.C.*

* Pins denoted as N.C. do not connect to any signal.

Port	Model	Pin	Manufacturer
CN11A	TM11R-5M2-88	8	Hirose Electric Corporation
CN11B	TM11R-5M2-88	8	Hirose Electric Corporation
CN12*	DF11-4DP-2DS (52)	4	Hirose Electric Corporation

* : For adjustment by Yaskawa personnel only. (Not for customer use)
Note: The connectors above or their equivalents are used for SERVOPACKs

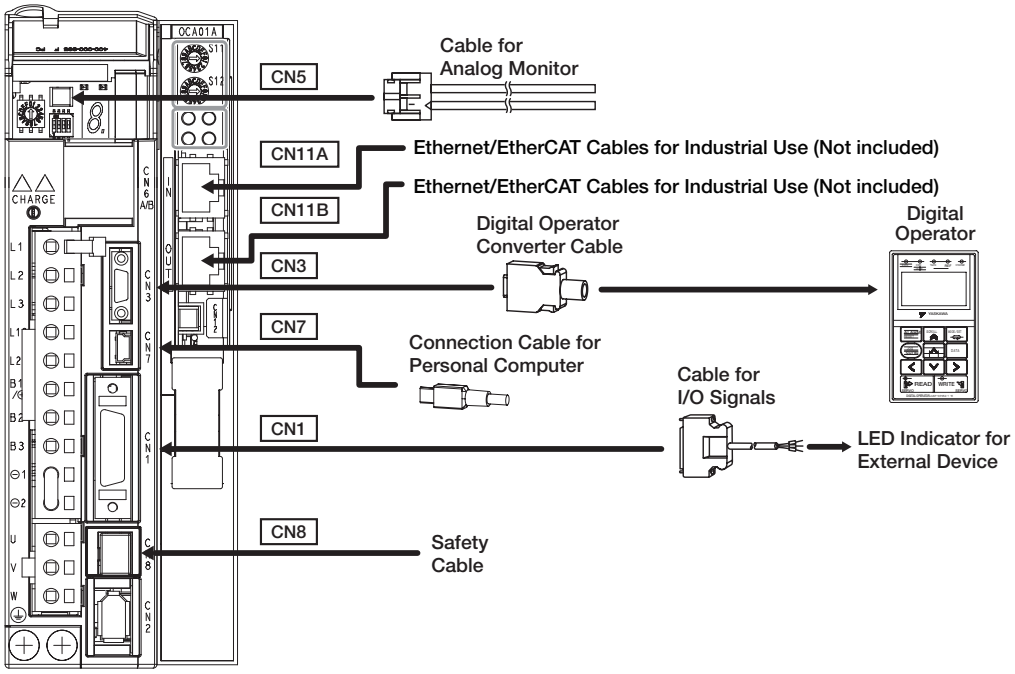
Specifications of the EtherCAT(CoE) Network Module

● Specifications

Items		Specifications
Power Specifications	Power Supply Method	Supplied from the control power supply of the SGDV SERVOPACK
Operating Conditions	Surrounding Air/Storage Temperature	Surrounding air temperature: 0 to 55°C, Storage temperature: –20 to 85°C
	Ambient/Storage Humidity	90% RH or less (with no freezing or condensation)
	Vibration/Shock Resistance	Vibration resistance: 4.9 m/s^2, Shock resistance: 19.6 m/s^2
	Protection Class/ Pollution Degree	Protection class: IP10, pollution degree: 2 Do not use SERVOPACKs in the following locations: • Locations subject to corrosive or flammable gases • Locations subject to exposure to water, oil, or chemicals • Locations subject to dust, including iron dust, and salts
	Altitude	1000 m or less
	Others	Do not use SERVOPACKs in the following locations: • Locations subject to static electricity noise, strong electromagnetic/magnetic fields, radioactivity
Conformance Standards		UL508C EN50178, EN55011/A2 Group1 Class A, EN61000-6-2 EN61800-3, EN61800-5-1, EN954-1, IEC61508-1 to 4
RoHS Directive		Compliant
Baud Rate		100 Mbps
Max. No. of Stations		65536 stations
Transmission Cycle		125 µs to 4 ms
Cable Length between Nodes		50 m max.
Topology		Cascade, star, tree, ring, line
Connector		RJ-45
Ethernet/EtherCAT Cables for Industrial Use (CN11A, CN11B)		Category: CAT5e Shield specifications: S/UTP or S/STP Cable length: 50 m maximum
Profile		CANopen (CoE) IEC61800-7 CiA402 Drive Profile
Control Mode		• Homing mode • Profile position mode • Interpolated position mode • Profile velocity mode • Profile Torque mode • Cyclic sync position mode • Cyclic sync velocity mode • Cyclic sync torque mode
Display		EtherCAT RUN indicator (RUN) × 1 EtherCAT ERR indicator (ERR) × 1 EtherCAT Link/Activity indicator × 2
Rotary Switch		Secondary Address : × 2

Selecting Cables

● Cables for CN1 CN3 CN5 CN7 CN8 CN11 for Command Option Attachable Type SERVOPACKs



Name		Length	Order No.	Specifications
CN1 Cables for I/O Signals	Connector Kit		JZSP-CSI9-2-E	Soldered
	Connector Terminal Converter Unit		JUSP-TA26P-E	Terminal Block and 0.5 m Connection Cable
	Cable with Loose wire at One End	1 m	JZSP-CSI02-1-E	
		2 m	JZSP-CSI02-2-E	
		3 m	JZSP-CSI02-3-E	
CN3	Digital Operator		JUSP-OP05A-1-E	With Connection Cable (1 m)
	Digital Operator Converter Cable*1	0.3 m	JZSP-CVS05-A3-E	Cable with Connectors at Both Ends
CN7 Connection Cables for Personal Computer		2.5 m	JZSP-CVS06-02-E	Cable with Connectors at Both Ends
CN5 Cables for Analog Monitor		1 m	JZSP-CA01-E	SERVOPACK End
CN8 Cables for Safety Functions	Cables with Connector*2	3 m	JZSP-CVH03-03-E JZSP-CVH03-03-E-G3	
	Connector kit*3		Contact Tyco Electronics AMP K.K. Product name : Industrial Mini I/O D-shape Type1 Plug Connector Kit Model : 2013595-1	
CN11A CN11B Ethernet/EtherCAT Cables for Industrial Use			Category: CAT5e Shield specifications: S/UTP or S/STP Cable length: 50 m maximum	

*1 : A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-Ⅴ series SERVOPACKs.
*2 : When using the safety function, connect this cable to the safety devices.
Even when not using the safety function, use SERVOPACKs with the Safe Jumper Connector (model: JZSP-CVH05-E) connected.
*3 : Use the connector kit when you make cables yourself.

Option Module for DeviceNet Communication Reference

● System Configuration for DeviceNet Communication Reference

Features

The DeviceNet Option Module implements the DeviceNet drive profile in DeviceNet communication.

- **Conforms to communication specifications of DeviceNet**
  Motion controls can be easily realized by connecting the SERVOPACK to the host controller with DeviceNet.
  Wide variety of DeviceNet tools commercially available can be used.
- **Monitor and control data of servo drives with the host controller**
  Status of servo drives and information on alarms can be monitored from the host controller by using the communications network.
  Maintenance can be easily done, because data of servo drives is controlled by the host controller. Less time is required for test runs and adjustments, and maintenance work can be done more efficiently.
- **Improved reliability at lower costs with less wiring**
  Much less wiring is needed, because the host controller and SERVOPACKs are connected with the communications network.
- **Wide variety of position control functions**
  Each positioning command can be easily executed from the host controller (PCL or PC).
  Variety of position control methods can be used: Simple positioning, homing, continuous speed operation, switching to positioning, and programmed operations.

DeviceNet Module (SGDV-OCA04A/OCA05A)

● Model Designations

SGDV – OC A04 A

Series	
SGDV	Σ-V Series

1st + 2nd digits: Module Type	
Code	Module
OC	Command option module

3rd + 4th + 5th digits: Interface Specifications	
Code	Interface
A04	Driven by SERVOPACK control power supply
A05	Driven by external power supply

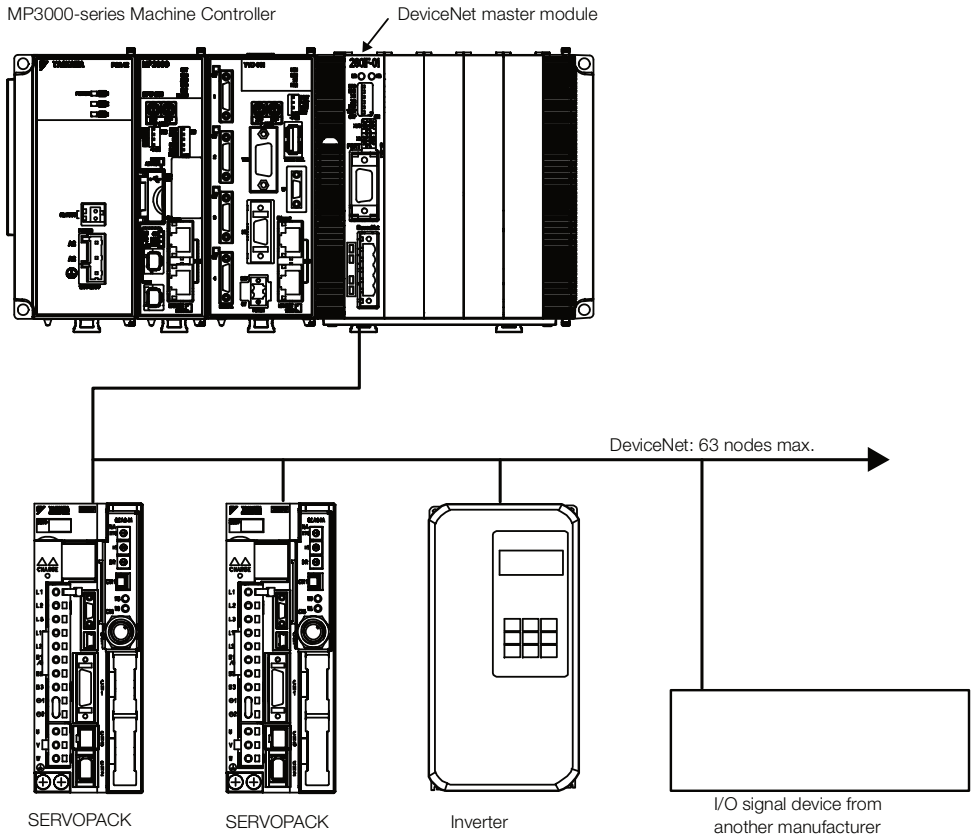
6th digit: Design Revision Order

Specifications of the DeviceNet Option Module

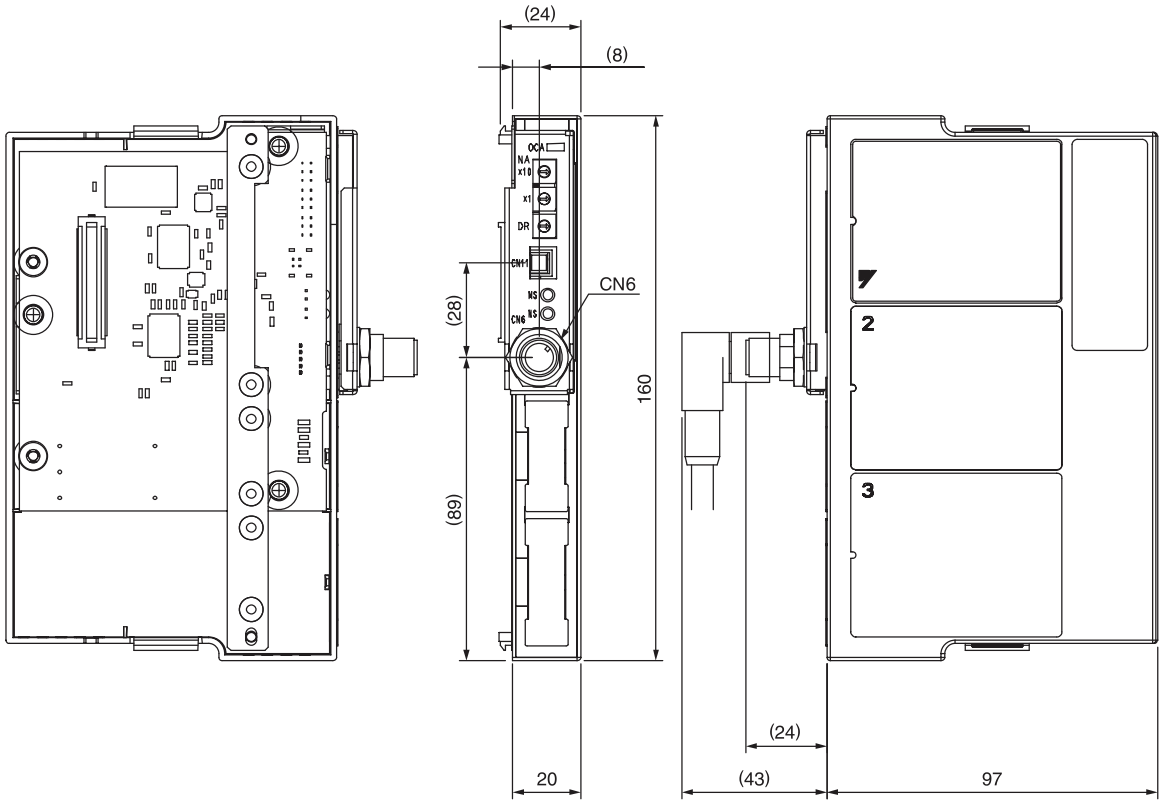
● Specifications

Items		Specifications	
		SGDV-OCA04A DeviceNet Module (Driven by SERVOPACK control power supply)	SGDV-OCA05A DeviceNet Module (Driven by external power supply)
Power Supply Method	Control Section	Supplied from the control power supply of a command option-attachable SERVOPACK.	Supplied from the DeviceNet cable.
	DeviceNet Communications Section	Supplied from the DeviceNet cable.	
Current Consumption	Control Section	Included in the current consumption of the command option-attachable SERVOPACK.	100 mA max for 24-VDC power supply DeviceNet 200 mA max for 11-VDC power supply
	DeviceNet Communications Section	25 mA max.	
Command Method	Operation Specifications	Positioning via DeviceNet communications	
	Reference Input	DeviceNet communications Commands: Movement references (positioning or speed) and homing	
Position Control Functions	Acceleration/Deceleration Method	Linear, asymmetrical, exponential, and S-curve acceleration/deceleration	
	Operating Methods	Simple positioning, homing, continuous speed operation, and switching to positioning	
	Fully-closed Control	Supported.	
Input Signals	Always Assigned to CN1	Counterclockwise overtravel prohibition (CCW-OT), clockwise overtravel prohibition (CW-OT), home signal input (/HOME), and external stop input (EXSTOP)	
Output Signals	Always Assigned to CN1	Brake (/BK), servo alarm (ALM), warning (/WARN), and servo ready (/S-RDY)	
Built-in Functions	Position Data Latching	Position data can be latched on phase C, the home signal, or the external signal.	
	LED Indicators	▪ MS: Module status ▪ NS: Network status	
DeviceNet Communications	Specifications	Conforms to those used with the ODVA DeviceNet Specification Release 2.0.	
	Topology	Multidrop or T-branching (1:N)*	
	Max. Number of Nodes	64 nodes (including the master, maximum number of slaves: 63)	
	Connectors for Communications	Micro-style connector (shielded)	
	Baud Rate	125 kbps, 250 kbps, or 500 kbps	
	Max. Network Length	125 kbps: 500 m; 250 kbps: 250 m; 500 kbps: 100 m	

* Externally connected terminating resistance is required.

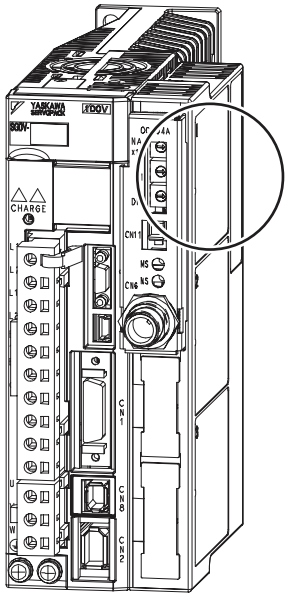


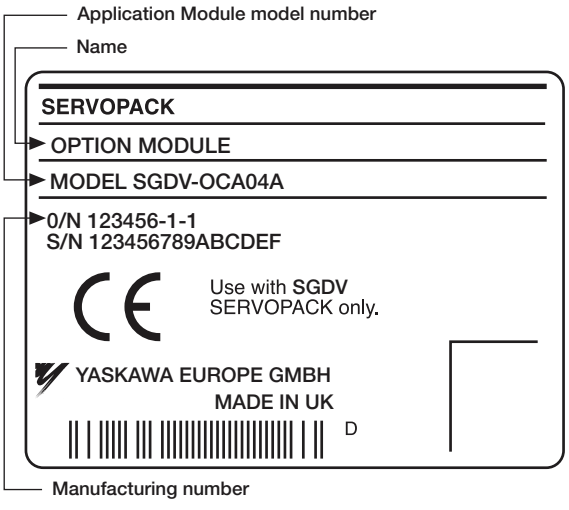
Dimensions



Port	Model	Pin	Manufacturer
CN6	CM02-8DR5P-CF	5	DDK Ltd.

Nameplate



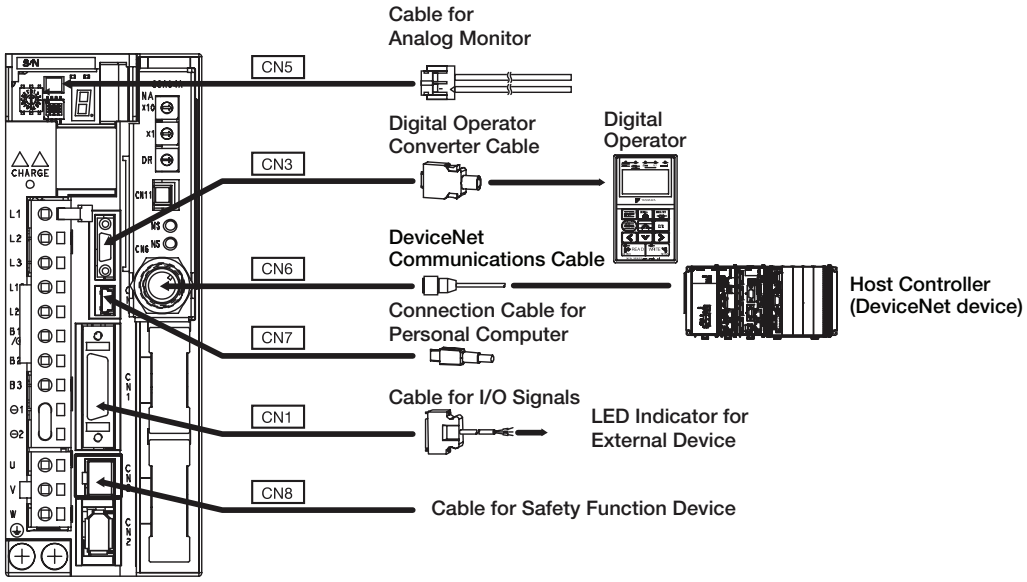


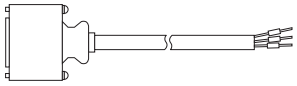
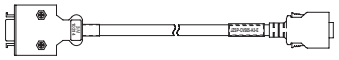
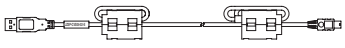
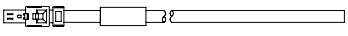
Model: SGDV-OCA04A
(Driven by SERVOPACK control power supply)

Model: SGDV-OCA05A
(Driven by external power supply)

Selecting Cables

● Cables for CN1 CN3 CN5 CN6 CN7 CN8 (DeviceNet Module-Mounted SERVOPACK)



Name		Length	Order No.	Specifications
CN1 Cables for I/O Signals	Connector Kit		JZSP-CSI9-2-E	Soldered 
	Connector Terminal Converter Unit	0.5 m	JUSP-TA26P-E	Terminal Block and Connection Cable 
		1 m	JUSP-TA26P-1-E	
		2 m	JUSP-TA26P-2-E	
	Cable with Loose wire at One End	1 m	JZSP-CSI02-1-E	
		2 m	JZSP-CSI02-2-E	
		3 m	JZSP-CSI02-3-E	
CN3	Digital Operator		JUSP-OP05A-1-E	With Connection Cable (1 m) 
	Digital Operator Converter Cable*1	0.3 m	JZSP-CVS05-A3-E	Cable with Connectors at Both Ends 
CN6 DeviceNet Communications Cable			The communications cable must be an ODVA-compliant DeviceNet cable. YASKAWA recommends using the following cable. DCA1-5CN02F1 (Connector with cable by OMRON) or equivalent.	
CN7 Connection Cables for Personal Computer		2.5 m	JZSP-CVS06-02-E	Cable with Connectors at Both Ends 
CN5 Cables for Analog Monitor		1 m	JZSP-CA01-E	SERVOPACK End 
CN8 Cables for Safety Functions	Cables with Connector*2	3 m	JZSP-CVH03-03-E JZSP-CVH03-03-E-G3	
	Connector Kit*3		Contact Tyco Electronics Japan G.K. Product name : Industrial Mini I/O D-shape Type1 Plug Connector Kit Model : 2013595-1	

*1 : A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-Ⅴ series SERVOPACKs.
*2 : When using the safety function, connect this cable to the safety devices.
Even when not using the safety function, use SERVOPACKs with the Safe Jumper Connector (model: JZSP-CVH05-E) connected.
*3 : Use the connector kit when you make cables yourself.

CANopen Network Module

● Product Overview for the CANopen Network Module

The CANopen network module is an add-on board, compatible with Σ-V Series models, which provides an interface for CANopen networking (Network type). The CANopen interface enables the user to achieve high-speed distributed control with a high level of reliability. CANopen is a higher-layer protocol commonly used in automation industry. The specification of this protocol is maintained and developed by the CiA (CAN in Automation) organization (www.can-cia.org).

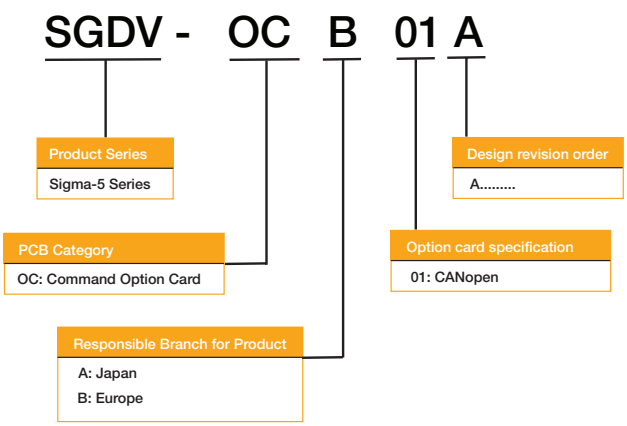
The SGDV-OCB01A offers a wide range of functions based on the following:

- CANopen DS-301 specification
- Drive profiles according to DS-402, V2.0 support the following modes:
  - Profile Position Mode
  - Homing Mode
  - Profile Velocity Mode
  - Profile Torque Mode
  - Interpolated position mode
- Additionally two touch probe functions are implemented
- Rotary switches for setting node ID – up to 127 nodes
- Communication rate of up to 1 Mbps
- Standard 9-pin D-type connector
- Two indicator LEDs according to CiA303-3

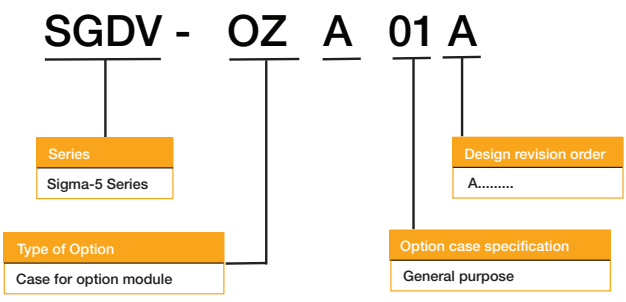
Model Designation

The network module that is mounted onto the servopack consists of the network card and the housing for the network card.

Model designation for the network card

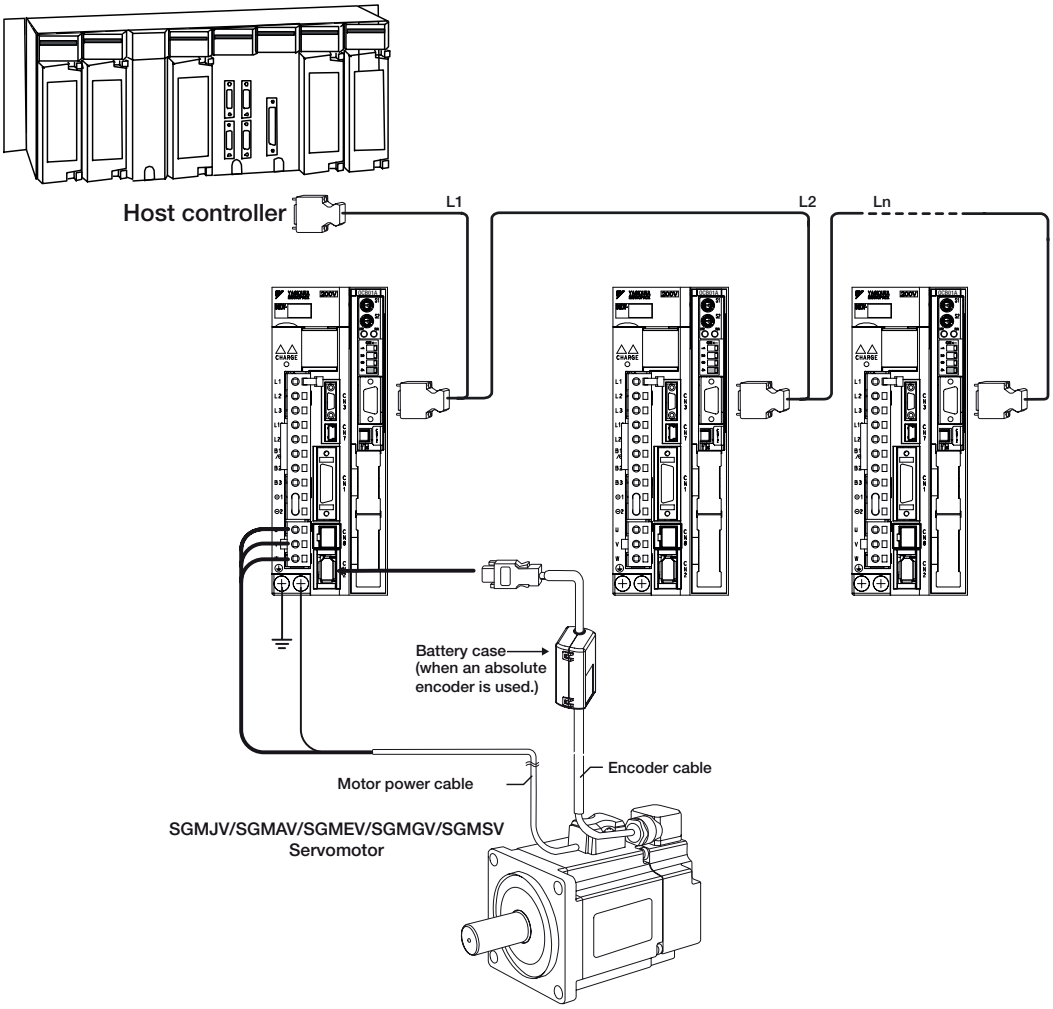


Model designation for the housing



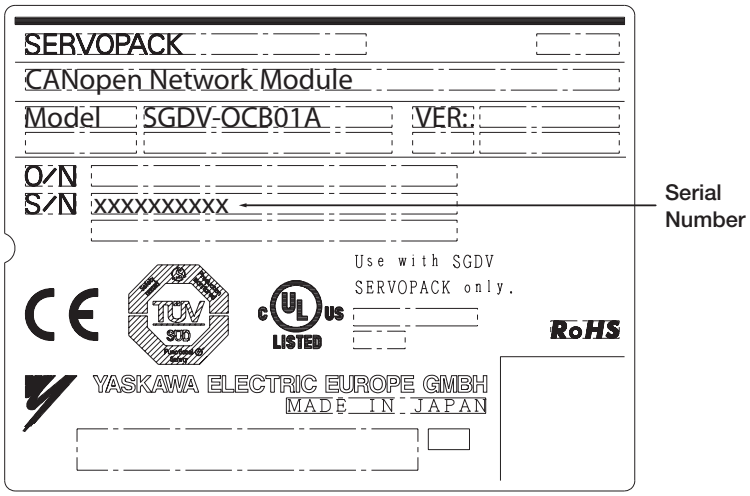
NOTE: Mounting of Option Modules on Amplifiers with Interface Option E1 and E5 requires mounting kit SGDV-OZA01A (metal bar, mounting screws and cover).

System Configuration for the CANopen Network Module



● Nameplate

The description and production details of the product are displayed on the network module's nameplate as shown below.

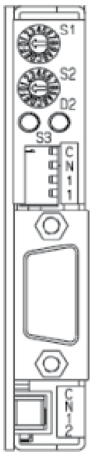


Serial Number

Hardware Interface of the CANopen Network Module

The table below describes the elements of the SGDV-OCB01A hardware interface as displayed in the figure on the right side of the table

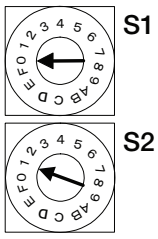
No.	Name	Description
1	RUN LED	Indicates the status of the CANopen network state machine.
2	ERROR LED	Indicates the status of the CAN physical layer and indicates errors due to missing CAN messages.
3	S1: Address Switch	Sets the most significant bit of the CAN node address (hexadecimal format).
4	S2: Address Switch	Sets the least significant bit of the CAN node address (hexadecimal format).
5	S3: Baud Rate Selection Switch	Sets the baud rate using the DIP switch S3.
6	CN11 connector	D-SUB 9-Pin Plug CAN Bus Connector
7	CN12 connector	14-Pin high density Serial Port connector



● S1 and S2 – Address switches

Each CAN device should be assigned with a unique identification number.
The identification number is referred to as the Node-ID. The Node-ID range is from 1 to 127.
The SGDV-OCB01A has two hexadecimal rotary switches for setting the Node ID.
The Node-ID is a combination of two hexadecimal digits.
The following table shows a few examples:

Decimal Address	Switch S1	Switch S2	Hexadecimal Value
01	0	1	01
58	3	A	3A
127	7	F	7F



Either the device must be powered on, or the application or communication must be reset for the newly set address to become effective. The factory default setting for the Node ID is 1.

● CAN Connector Terminal Layout

The SGDV-OCB01A is connected to the CAN Bus with the CN11 connector.
Connector type: D-type, 9 pin, male.

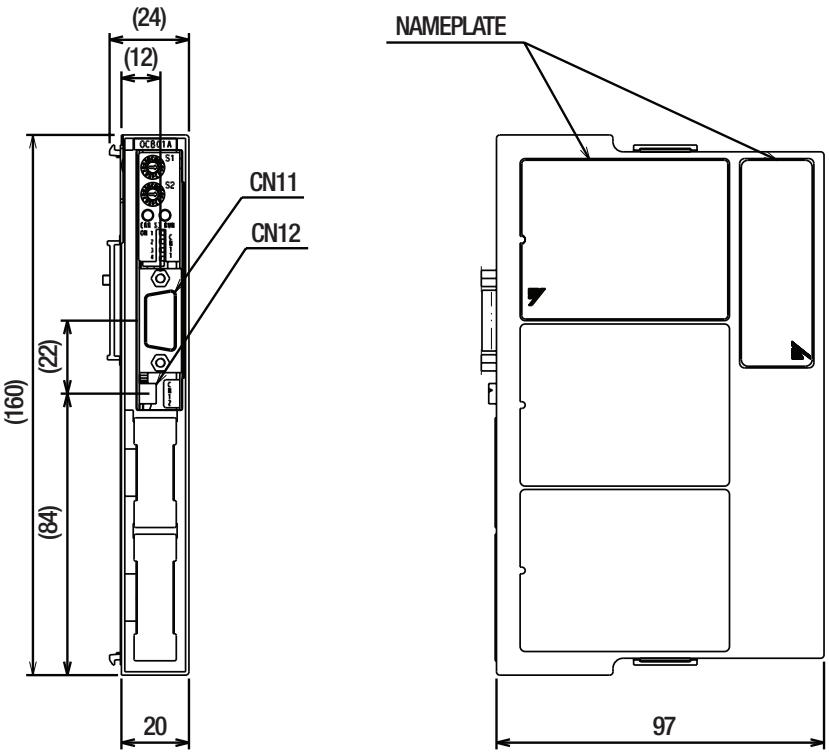
Pin No.	Name
1	NC
2	CAN-L
3	GND
4	NC
5	NC
6	NC
7	CAN -H
8	NC
9	NC
Shield	Connected to CAN cable shield

Specifications of the CANopen Network Module

● Specifications

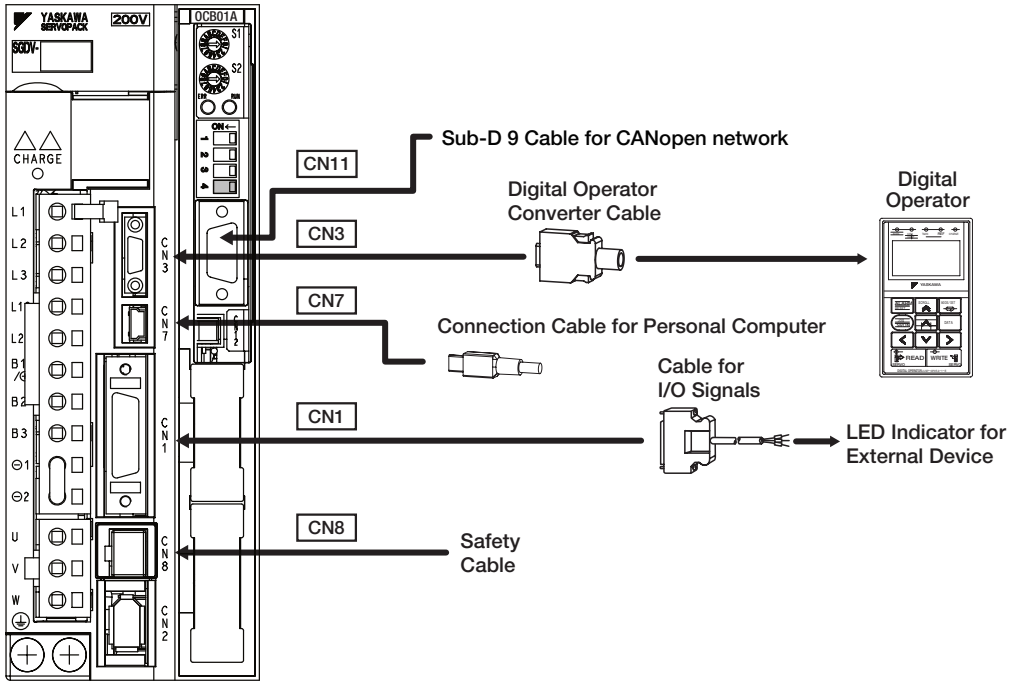
Items		Specifications
Applicable SERVOPACK		Σ-V Series SGDV-□□□□□E SERVOPACK, all models
Placement		Attached to the SERVOPACK
Power Specification	Power Supply Method	Supplied from the control power supply of the SGDV SERVOPACK
Operating Conditions	Surrounding Air/Storage Temperature	Surrounding air temperature: 0 to +55°C, Storage temperature: -20 to +85°C
	Ambient/Storage Humidity	90% RH or less (with no condensation)
	Ambient temperature to ensure long-term reliability	+45 °C or less
	Vibration/Shock Resistance	Vibration resistance: 4.9 m/s^2 or less, Shock resistance: 19.6 m/s^2
	Protection Class/ Pollution Degree	Protection class: IP10, pollution degree: 2 Do not use SERVOPACKs in the following locations: • Locations subject to corrosive or flammable gases • Locations subject to exposure to water, oil, or chemicals • Locations subject to dust, including iron dust, and salts
	Altitude	1000 m or less
	Others	Do not use SERVOPACKs in the following locations: • Locations subject to static electricity noise, strong electromagnetic/magnetic fields, radioactivity
Conformance Standards		• CiA Specifications • Safety Standard UL508 • Material Compliance UL94V-0 • WEEE Directive 2002/96/EC • Low Voltage Directive 73/23/EEC • EMC Directive 89/336/EEC
RoHS Directive 2002/95/EC		Compliant
CANopen communication standards		DS-301, V4.02
CAN bit rates		10, 20, 50, 125, 250, 500, 800, 1000 Kbps
CAN identifier		Standard 11 bit
CANopen node-ID		1-127 (set by two rotary switches)
Connector		Sub-D 9
SDO communication		1 server
Block transfer		No
Segmented transfer		Yes
Block transfer		No
PDO communication		Producer and consumer, default setting according to DS-402
Supported RPDOs		1 to 4
Supported TPDOs		1 to 4
SYNC		Consumer
Time stamp		No
Emergency messages		Producer
Node guarding		No
Heartbeat		Producer and Consumer
Non-volatile storage		Yes
CANopen profile for drives		DS-402, V2.0
Axis types		Linear and Rotary
Motor type		Brushless AC servo
Current consumption		0.28 A from 5 V DC Servo Drive supply

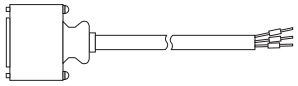
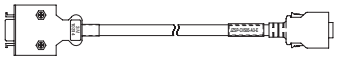
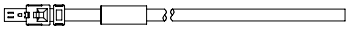
Dimensions of the CANopen Network Module



Selecting Cables

● Cables for CN1 CN3 CN7 CN8 CN11 for Command Option Attachable Type SERVOPACKs



Name		Length	Order No.	Specifications
CN1 Cables for I/O Signals	Connector Kit		JZSP-CSI9-2-E	Soldered 
	Connector Terminal Converter Unit		JUSP-TA26P-E	Terminal Block and 0.5 m Connection Cable 
	Cable with Loose wire at One End	1 m	JZSP-CSI02-1-E	
		2 m	JZSP-CSI02-2-E	
		3 m	JZSP-CSI02-3-E	
CN3	Digital Operator		JUSP-OP05A-1-E	With Connection Cable (1 m) 
	Digital Operator Converter Cable*1	0.3 m	JZSP-CVS05-A3-E	Cable with Connectors at Both Ends 
CN7 Connection Cables for Personal Computer		2.5 m	JZSP-CVS06-02-E	Cable with Connectors at Both Ends 
CN8 Cables for Safety Functions	Cables with Connector*2	3 m	JZSP-CVH03-03-E JZSP-CVH03-03-E-G3	
	Connector kit*3		Contact Tyco Electronics AMP K.K. Product name : Industrial Mini I/O D-shape Type1 Plug Connector Kit Model : 2013595-1	
CN11 CANopen Cable for Industrial Use			CANopen cable has a single twisted pair with overall shielding. CANopen has a specified colour code, and it is strongly recommended that this code is maintained. Since CANopen networks run at high data rates, they require cable specifically designed to carry high frequency signals. Low quality cable will attenuate the signals, and may render the signal unreadable for the other nodes on the network. We can only guarantee correct and reliable operation if all other equipment installed on the CANopen network (including the network cable) has been approved by CAN in Automation (CiA).	

*1 : A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-Ⅴ series SERVOPACKs.
*2 : When using the safety function, connect this cable to the safety devices.
Even when not using the safety function, use SERVOPACKs with the Safe Jumper Connector (model: JZSP-CVH05-E) connected.
*3 : Use the connector kit when you make cables yourself.

Option Module for Ethernet Powerlink Communication Reference

● Functional principle

Ethernet POWERLINK (EPL) is a communication profile for Real-Time Ethernet (RTE). It extends Ethernet according to the IEEE 802.3 standard with mechanisms to transfer data with predictable timing and precise synchronization. The communication profile meets timing demands typical for high-performance automation and motion applications. It does not change basic principles of the Fast Ethernet Standard IEEE 802.3 but extends it towards Real-Time Ethernet. Thus it is possible to leverage and continue to use any standard Ethernet silicon, infrastructure component or test and measurement equipment like a network analyzer.

The ∑-V series Ethernet POWERLINK Network Module implements the CANopen drive profile DS 402 from CiA402 in Ethernet POWERLINK communication (real-time Ethernet communication).

Position, velocity, and torque control can be performed. An appropriate form of system control can be selected, from simple positioning to high-speed, high-precision locus control.

Moreover, the ∑-V high servo control performance, advanced tuning function, and wide range of actuator controls can be performed via Powerlink.

Features

- Ease-of-Use to be handled by typical automation engineers without in-depth Ethernet network knowledge
- up to 240 networked real-time nodes in one network segment
- deterministic communication guaranteed
- IAONA Real-Time Class 4, highest performance
  - minimum cycle time of ≤ 200 µs
  - minimum jitter of < 1 µs, for precise synchronization of networked nodes
- direct peer-to-peer communication of all nodes (publish/subscribe)
- “Hot Plugging” functionality
- Seamless integration into other networks via routing
- Standard Compliant
  - IEEE 802.3u Fast Ethernet
  - IP based protocols supported, e.g. UDP
  - Integration with CANopen Profiles EN50325-4 for device interoperability

Model Designation

SGDV – OC B02 A

Series	
SGDV	Σ-V Series

1st + 2nd digits: Module Type	
Code	Module
OC	Command option module

3rd + 4th + 5th digits: Interface Specifications	
Code	Interface
B02	Ethernet POWERLINK

6th digit: Design Revision Order

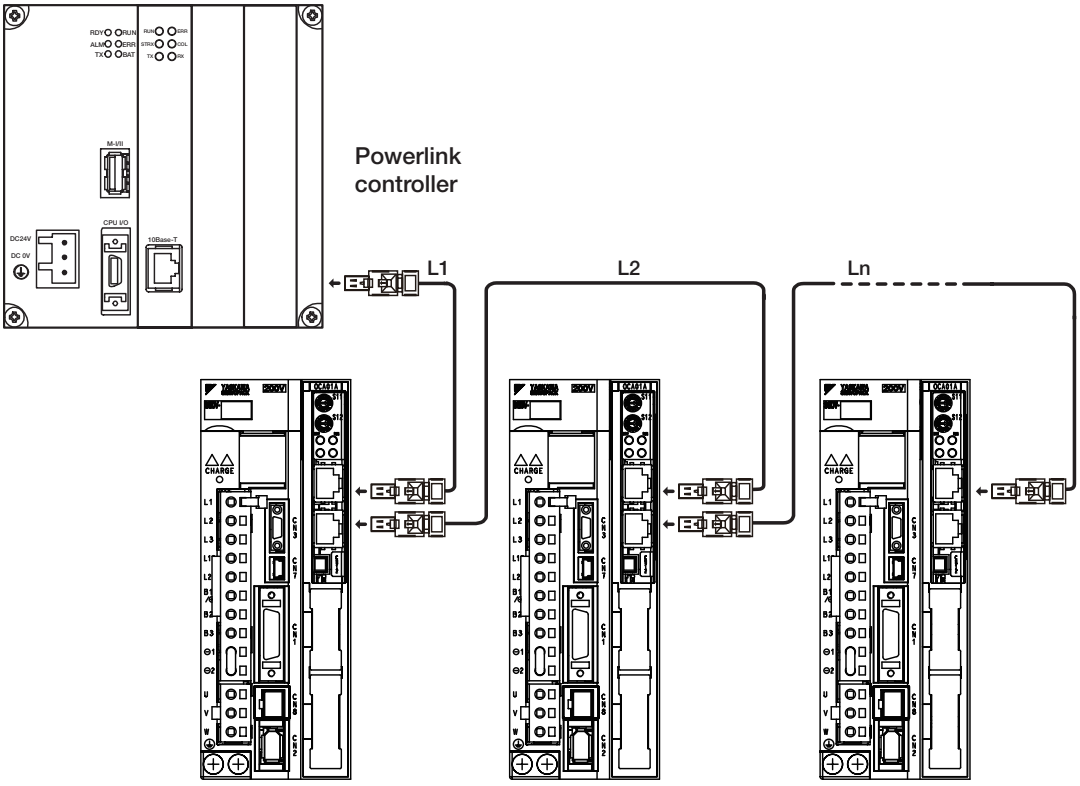
NOTE: Mounting of Option Modules on Amplifiers with Interface Option E1 and E5 requires mounting kit SGDV-OZA01A (metal bar, mounting screws and cover).

System Configuration for Ethernet Powerlink Communication Reference

The following figure shows an example of connections between a host controller and a SERVOPACK using the Powerlink communication.

Connect the connector of the Powerlink communications cable to the connectors CN11A and CN11B.

Connect CN11A to the master and CN11B to the slave. If reversed, communication will not be successfully performed.



Powerlink Connector (RJ45)

Connector	Description
CN11A	Powerlink signal input
CN11B	Powerlink signal output

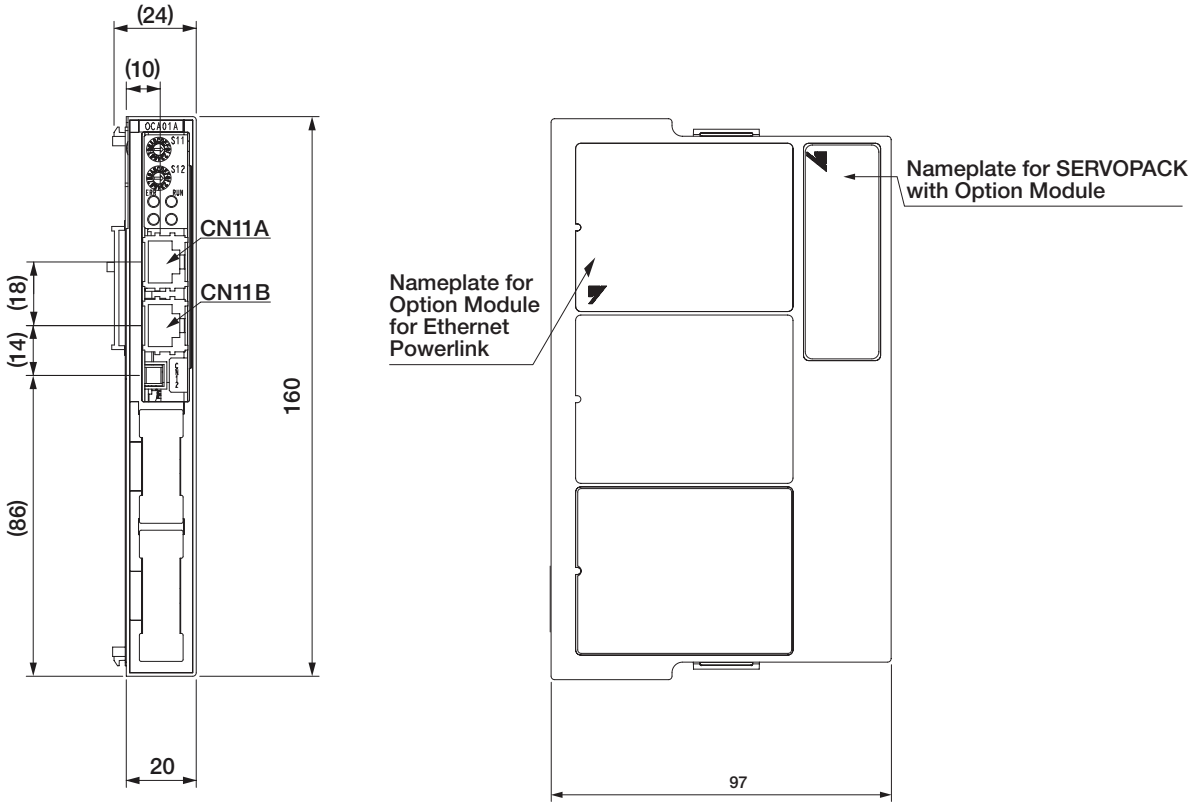
- Connector Pin Arrangement

Pin No.	Signal Name	Remarks
1	TD+	Send data
2	TD-	
3	RD+	Receive data
4	–	N.C.*
5	–	N.C.*
6	RD-	Receive data
7	–	N.C.*
8	–	N.C.*

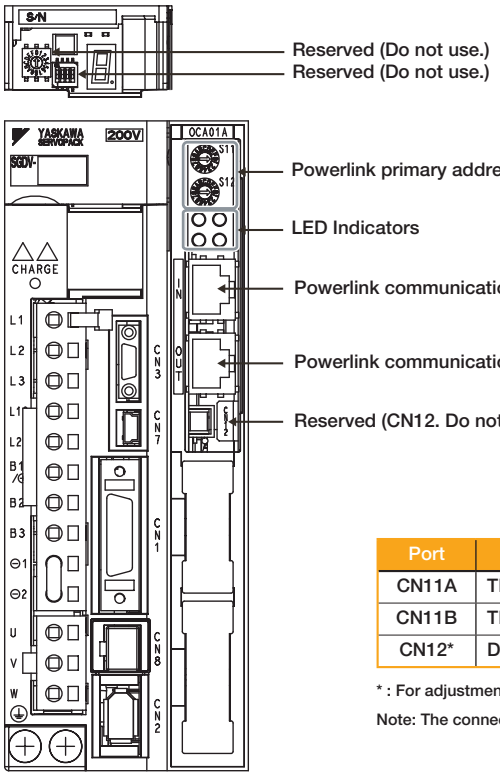
* Pins denoted as N.C. do not connect to any signal.

External Dimensions Units: mm

● System Configuration for Ethernet Powerlink Communication Reference



Approx. Mass: 0.1 kg



Front View: With front cover open

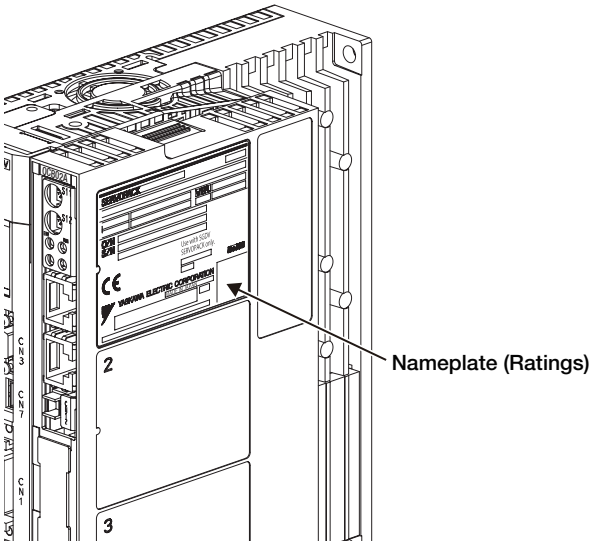
Port	Model	Pin	Manufacturer
CN11A	TM11R-5M2-88	8	Hirose Electric Corporation
CN11B	TM11R-5M2-88	8	Hirose Electric Corporation
CN12*	DF11-4DP-2DS (52)	4	Hirose Electric Corporation

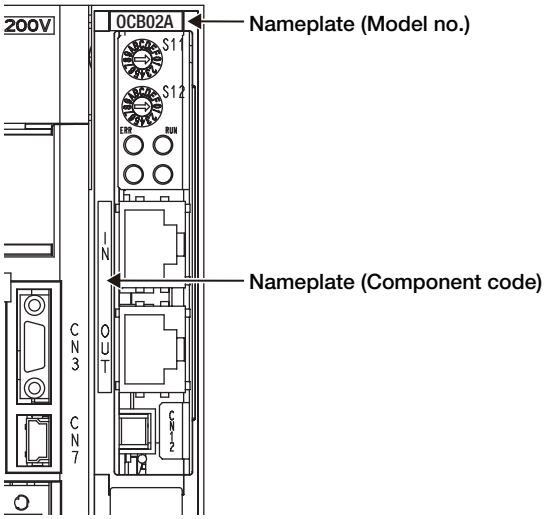
* : For adjustment by Yaskawa personnel only. (Not for customer use)

Note: The connectors above or their equivalents are used for SERVOPACKs

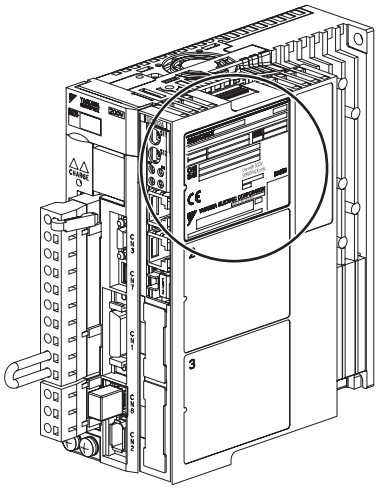
Nameplate and model designation

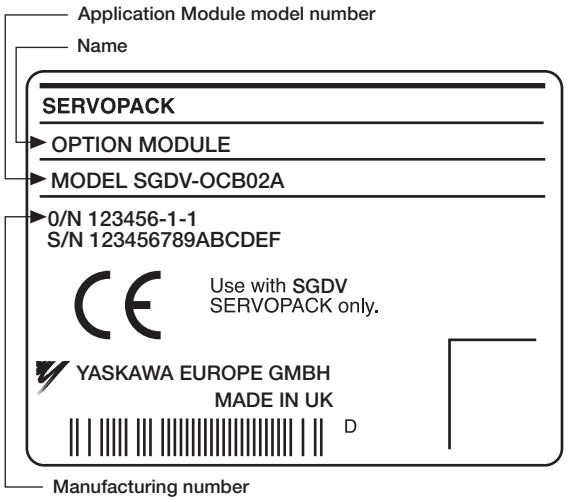
● Nameplate (Ratings)



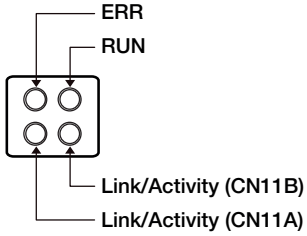


● Nameplate Location

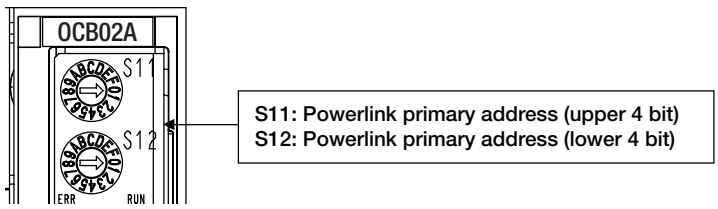




● LED indicators



● Powerlink Primary Address Settings



The Powerlink primary address (Station Alias) can be used for identification or for addressing of a device.

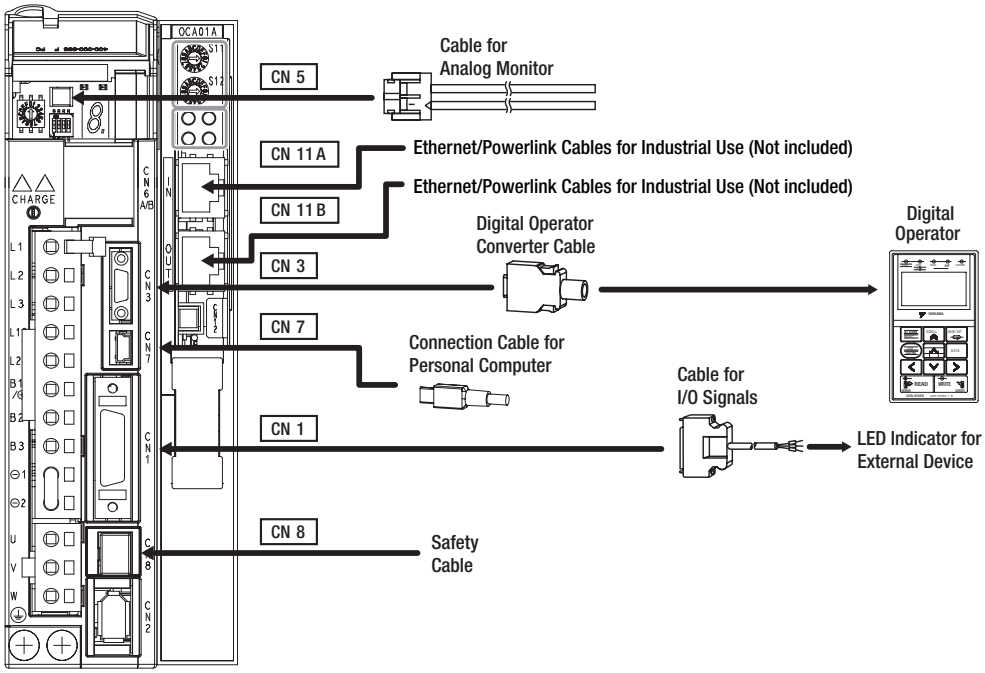
Specifications of the Ethernet Powerlink Network Module

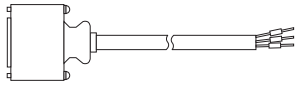
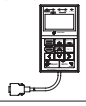
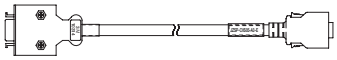
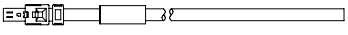
● Specifications

Items		Specifications
Power Specifications	Power Supply Method	Supplied from the control power supply of the SGDV SERVOPACK
Operating Conditions	Surrounding Air/Storage Temperature	Surrounding air temperature: 0 to 55°C, Storage temperature: –20 to 85°C
	Ambient/Storage Humidity	90% RH or less (with no freezing or condensation)
	Vibration/Shock Resistance	Vibration resistance: 4.9 m/s^2, Shock resistance: 19.6 m/s^2
	Protection Class/ Pollution Degree	Protection class: IP10, pollution degree: 2 Do not use SERVOPACKs in the following locations: • Locations subject to corrosive or flammable gases • Locations subject to exposure to water, oil, or chemicals • Locations subject to dust, including iron dust, and salts
	Altitude	1000 m or less
	Others	Do not use SERVOPACKs in the following locations: • Locations subject to static electricity noise, strong electromagnetic/magnetic fields, radioactivity
Conformance Standards		UL508C EN50178, EN55011/A2 Group1 Class A, EN61000-6-2 EN61800-3, EN61800-5-1, EN954-1, IEC61508-1 to 4
RoHS Directive		Compliant
Baud Rate		100 Mbps, half-duplex
Max. No. of Stations		240 stations
Transmission Cycle		125 µs to 4 ms
Cable Length between Nodes		100 m max.
Topology		Cascade, star, tree, ring, line
Connector		RJ-45
Ethernet Cables for Industrial Use (CN11A, CN11B)		Category: CAT5e Shield specifications: S/UTP or S/STP Cable length: 50 m maximum
Profile		Ethernet Powerlink version V 2 IEC 61800-7-1/2/3 Committee Draft
Control Mode		• Homing mode • Profile position mode • Interpolated position mode • Profile velocity mode • Profile Torque mode
Display		Powerlink STATUS indicator (green) × 1 Powerlink ERROR indicator (red) × 1 Powerlink Link/Activity indicator × 2
Rotary Switch		Primary Address : × 2

Selecting Cables

● Cables for CN1 CN3 CN5 CN7 CN8 CN11 for Command Option Attachable Type SERVOPACKs



Name		Length	Order No.	Specifications
CN1 Cables for I/O Signals	Connector Kit		JZSP-CSI9-2-E	Soldered 
	Connector Terminal Converter Unit		JUSP-TA26P-E	Terminal Block and 0.5 m Connection Cable 
	Cable with Loose wire at One End	1 m	JZSP-CSI02-1-E	
		2 m	JZSP-CSI02-2-E	
		3 m	JZSP-CSI02-3-E	
CN3	Digital Operator		JUSP-OP05A-1-E	With Connection Cable (1 m) 
	Digital Operator Converter Cable*1	0.3 m	JZSP-CVS05-A3-E	Cable with Connectors at Both Ends 
CN7 Connection Cables for Personal Computer		2.5 m	JZSP-CVS06-02-E	Cable with Connectors at Both Ends 
CN5 Cables for Analog Monitor		1 m	JZSP-CA01-E	SERVOPACK End 
CN8 Cables for Safety Functions	Cables with Connector*2	3 m	JZSP-CVH03-03-E JZSP-CVH03-03-E-G3	
	Connector kit*3		Contact Tyco Electronics AMP K.K. Product name : Industrial Mini I/O D-shape Type1 Plug Connector Kit Model : 2013595-1	
CN11A CN11B Ethernet/Powerlink Cables for Industrial Use			Category: CAT5e Shield specifications: S/UTP or S/STP Cable length: 50 m maximum	

*1 : A converter cable is required to use Σ-Ⅲ series digital operators (model: JUSP-OP05A) for Σ-Ⅴ series SERVOPACKs.

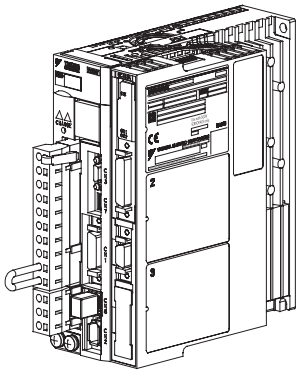
*2 : When using the safety function, connect this cable to the safety devices.
Even when not using the safety function, use SERVOPACKs with the Safe Jumper Connector (model: JZSP-CVH05-E) connected.

*3 : Use the connector kit when you make cables yourself.

INDEXER Option Module for single-axis positioning

● Product Overview for the INDEXER Option Module

The INDEXER Module is a single-axis positioning device that is equipped with a program table operation function. It is mounted to the side of the SERVOPACK. The INDEXER Module has two reference methods: digital I/O and serial commands.
Digital I/O is structured as a program table (Mode 0) or homing/JOG speed table (Mode 1). If the program table (Mode 0) is being used, the program step selected with the input signal pattern (binary format) can be executed. If the JOG speed table (Mode 1) is being used, the JOG speed selected with the input signal pattern (binary format) can be executed.
With serial commands, ASCII command strings are sent to the INDEXER Module through RS-422 or RS-485 communications and these commands are interpreted and executed immediately.
The support software tool, SigmaWin+, can be used to easily set program tables and parameters or to perform monitoring operations.
These same operations can also be performed using serial commands.



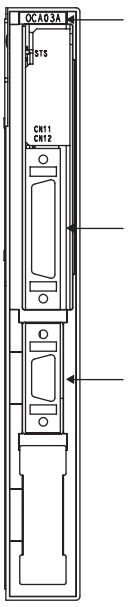
INDEXER Module
Mounted on ∑-V Series SGDV SERVOPACK

Simple
- Program tables for easy programming and serial commands for easy realization of motion control.
- The setup support tool (SigmaWin+) for Windows enables easy start-up.
- Simple connection to the host controller can be established via the I/O module.

Smart
- By using program tables, all required operations (including positioning) can be simplified. For positioning, up to 256 steps can be programmed.
- Various functions, including external positioning, JOG table operation, homing, and programmable signal outputs are provided. I/O points: Input 19 points, Output 16 points

Speedy
- Reliable high-speed, high-precision positioning when combined with high-performance Σ-V series servo drives.
- Motion control is accomplished without using motion controllers.

Model Designation



Nameplate (Model no.)

CN11
I/O Signal
Connector

CN12 Serial command communications

SGDV – OC A03 A

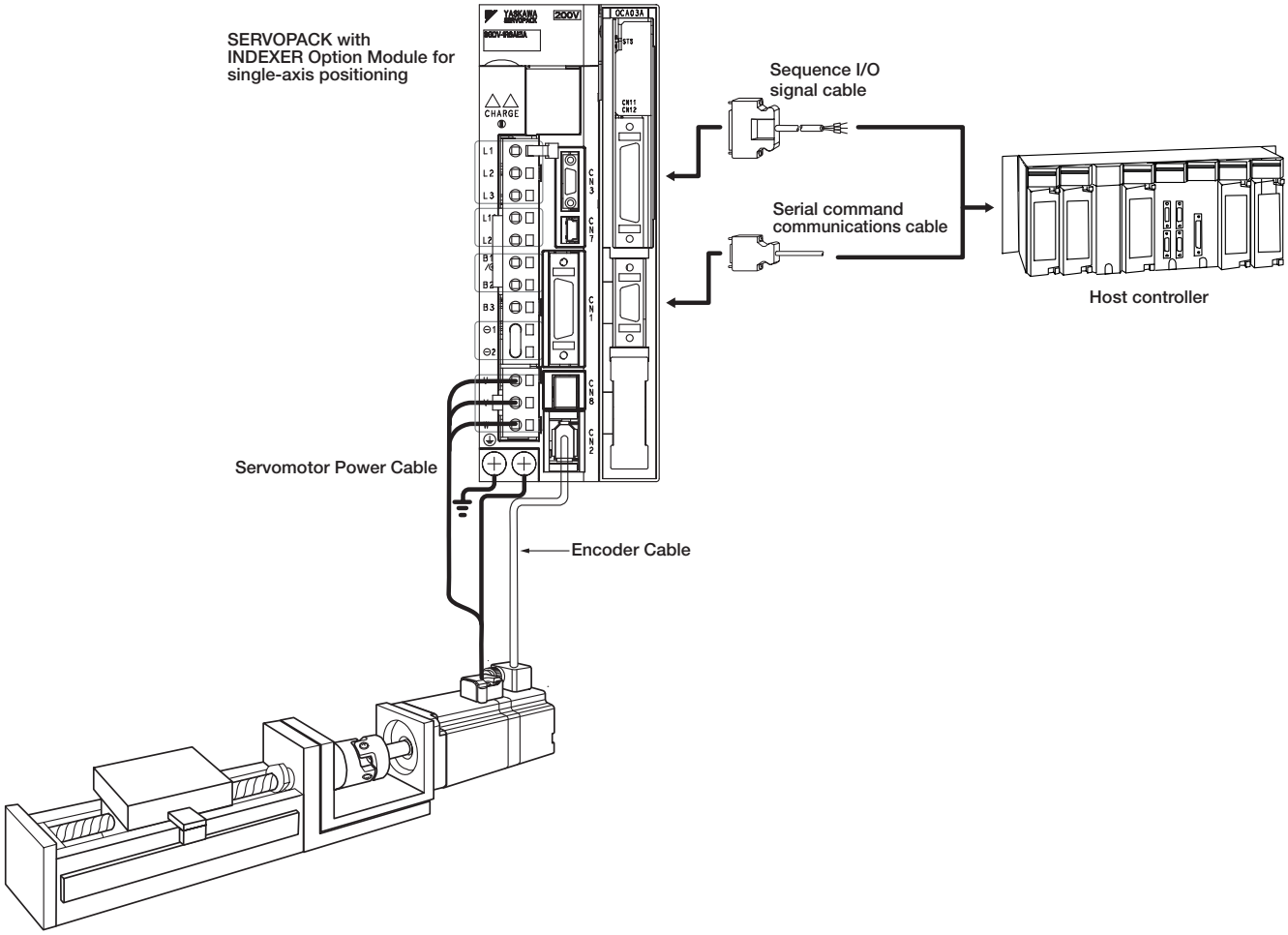
Series	
SGDV	Σ-V Series

1st + 2nd digits: Module Type	
Code	Module
OC	Command option module

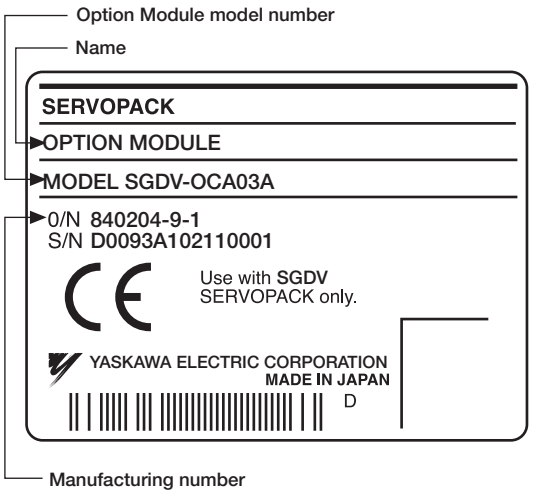
3rd + 4th + 5th digits: Interface Specifications	
Code	Interface
A03	INDEXER

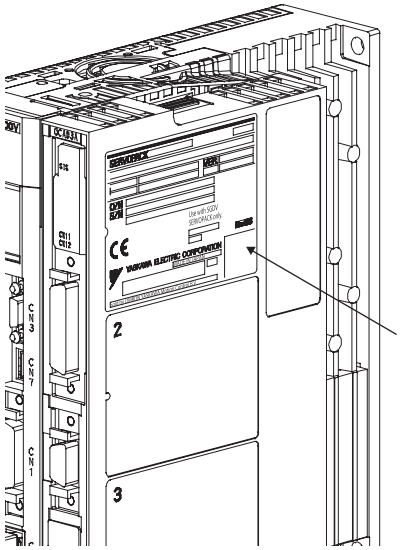
6th digit: Design Revision Order

NOTE: Mounting of Option Modules on Amplifiers with Interface Option E1 and E5 requires mounting kit SGDV-OZA01A (metal bar, mounting screws and cover).



● Nameplate example



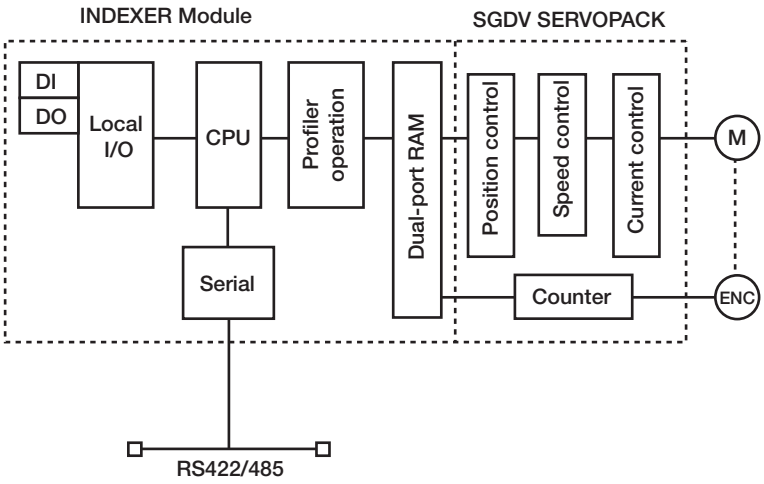


INDEXER Option Module for single-axis positioning

● INDEXER Module Functions

Function	Description
Digital I/O Program Table (Mode 0)	The program step selection input signals (binary format) are used to select the desired positioning data from the program table stored in the INDEXER Module. The INDEXER Module can store up to 256 program steps. The program steps can be linked to create combinations that perform more complex motions.
Digital I/O Homing/JOG Speed Table (Mode 1)	Homing using an incremental encoder and operation using a JOG speed table with up to 16 speed levels can be performed.
Serial Commands	Positioning can be controlled by ASCII command strings received through RS-422 or RS-485 communications. Up to 16 axes can be connected. ASCII commands can also be used to operate using a program table.
Registration	Both the program table and serial commands are equipped with registration functions for external positioning.
Programmable Output Signals	There are 8 output signals (/POUT0 to /POUT7) for which the output status can be specified.
Zone Signals and Zone Table	The programmable output signals (/POUT0 to /POUT4) can also be used as zone signals. Up to 32 zones can be specified in the zone table.

Block Diagram



● Communications Specifications of the CN12 connector

Item	Specifications
Interface	Full duplex (RS-422) or half duplex (RS-485) (Selectable with parameter PnB00.)
Max. Number of Axes	16 axes
Total Cable Length	RS-422/RS-485: 50 m max.
Bit Rate	9600, 19200, or 38400 bps (Selectable with parameter PnB01. Factory setting: 9600 bps)
Synchronization	Start-stop synchronization
Data Format	Start bits: 1 bit
	Data bits: 7 bits, ASCII
	Parity: 1 bit, even parity
	Stop bits: 1 bit
Flow Control	None
Shift Control	None

Specifications of the INDEXER Option Module

● Specifications

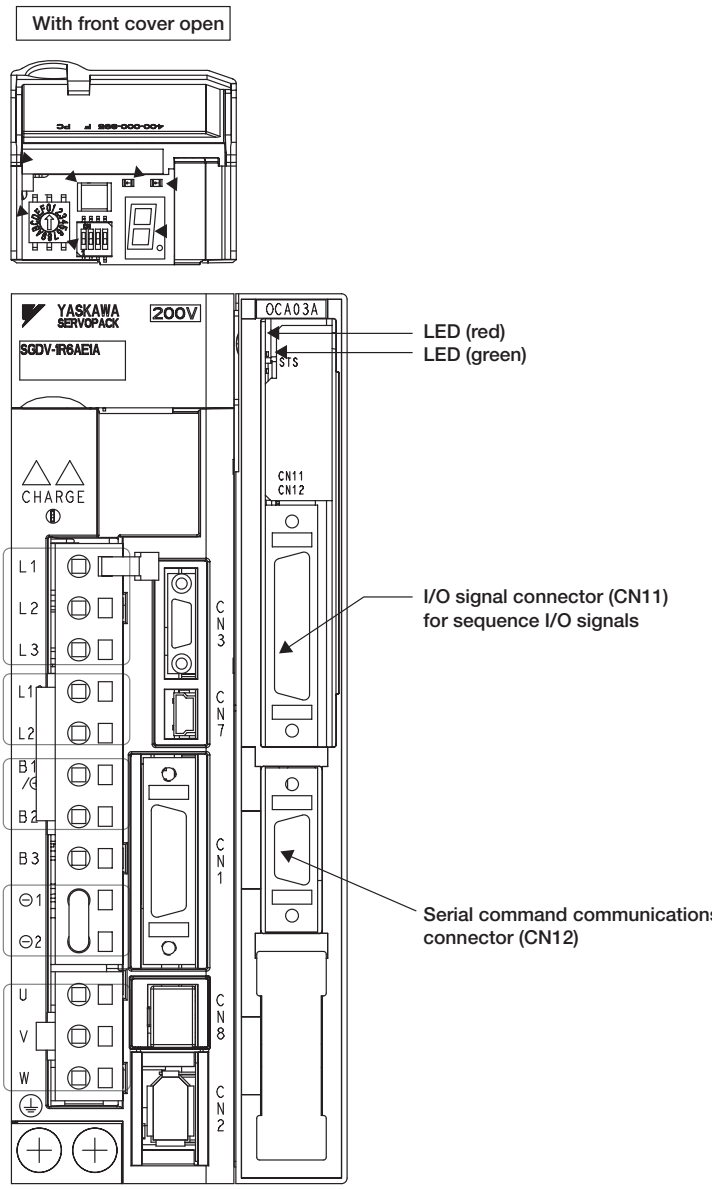
Items		Specifications
Applicable SERVOPACK		∑-V Series SGDV-□□□□□E SERVOPACK, all models
Placement		Attached to the SERVOPACK
Power Specification	Power Supply Method	Supplied from the control power supply of the SGDV SERVOPACK
Operating Conditions	Surrounding Air/Storage Temperature	Surrounding air temperature: 0 to +55°C, Storage temperature: –20 to +85°C
	Ambient/Storage Humidity	90% RH or less (with no condensation)
	Vibration/Shock Resistance	Vibration resistance: 4.9 m/s², Shock resistance: 19.6 m/s²
	Protection Class/ Pollution Degree	Protection class: IP10, pollution degree: 2 Do not use SERVOPACKs in the following locations: • Locations subject to corrosive or explosive gases • Locations subject to exposure to water, oil, or chemicals • Locations subject to dust, including iron dust, and salts
	Altitude	1000 m or less
	Others	Do not use SERVOPACKs in the following locations: •Locations subject to static electricity noise, strong electromagnetic/magnetic fields, radioactivity
Control Method	Program Table Method	Program table positioning in which steps are executed sequentially by commands given through contact input or serial communications Positioning in which station numbers are specified by commands given through contact input or serial communications
	Max. Number of Steps	256
	Max. Number of Tables	256
	Max. Number of Stations	256
	Serial Communications Method	Serial command by 1-channel ASCII code Communications specifications: RS-422/485 (50 m max.) Connection topology: Multi-drop connection (16 axes max.) Baud rate: 9600, 19200, 38400 bps
Other functions		Registration (positioning by external signals), homing
Display Function	LED	Lit during parameter setting, monitoring, executing utility functions, etc.
Applicable Standards*		UL508C EN50178, EN61800-5-1 EN55011 Group1 Class A EN61800-3, EN61000-6-2

** Applicable when the INDEXER Module is attached to the command option attachable type SERVOPACKs.*

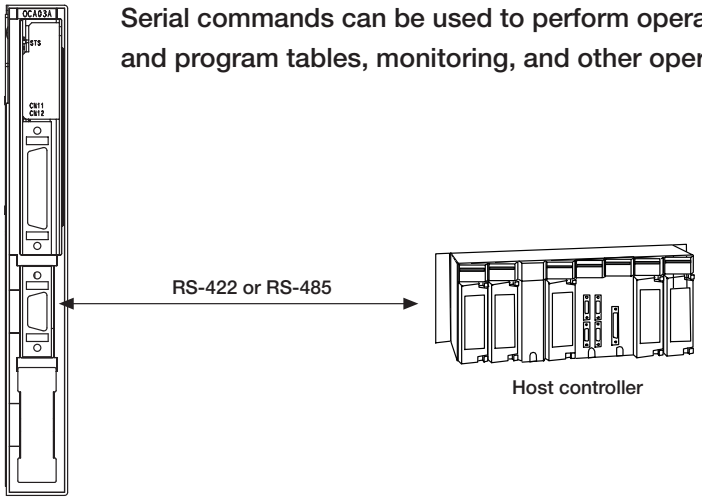
● LED Indicators

Status	Red LED	Green LED
Control Power Supply OFF	Not lit	Not lit
Control Power Supply ON	Not lit	Flashing
Normal	Not lit	Lit
Overtravel/Software Limit Activated		
Resetting	–	Flashing
Saving a Table		
Initializing a Table		
Initializing Parameters		
Error	Flashing (2 seconds)	–
Warning	Flashing	–
Alarm	Lit	Not lit

Part Names of the INDEXER Option Module



● Serial Command Communications Connector (CN12)



Serial commands can be used to perform operations such as positioning, setting parameters and program tables, monitoring, and other operations.

I/O signals

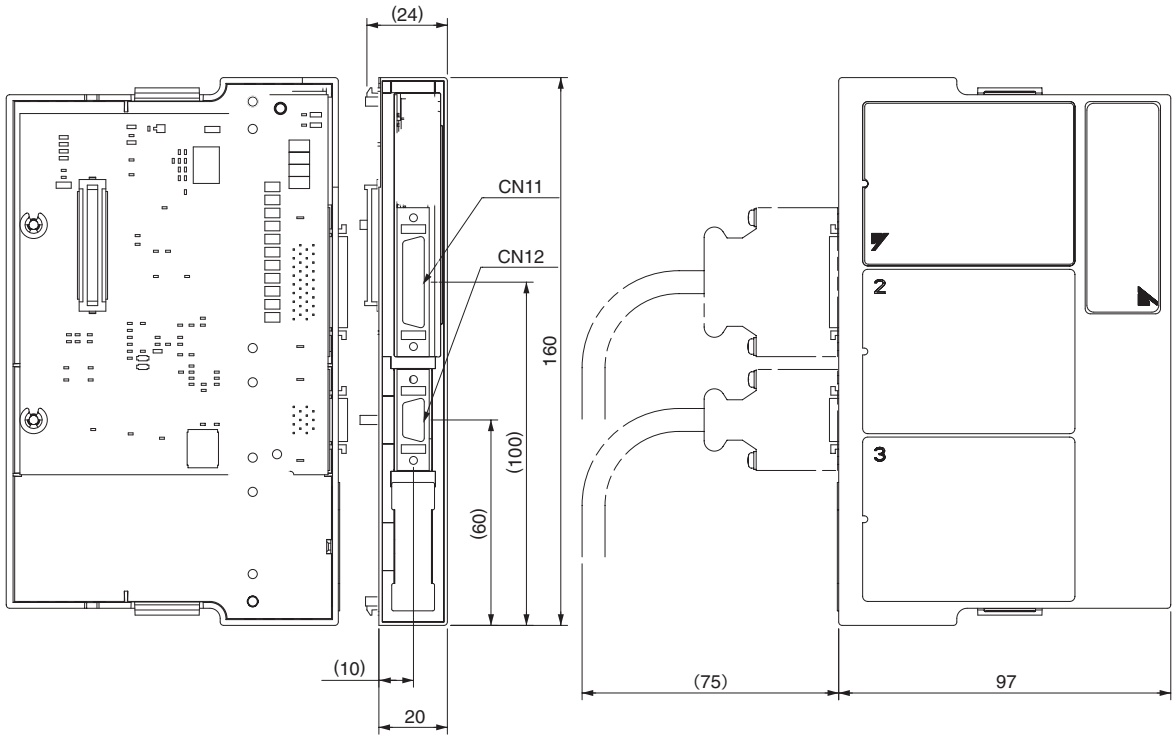
<table>
<tr><th colspan="3">Items</th><th colspan="2">Specifications</th></tr>
<tr><td rowspan="4">I/O Signal</td><td rowspan="2">Input</td><td>SERVOPACK End</td><td colspan="2">• Servo ON (/S-ON)
• Forward run prohibited (P-OT), reverse run prohibited (N-OT)
• Homing deceleration limit switch (/DEC)
• Alarm reset (/ALM-RST)
• Registration latch (/RGRT)</td></tr>
<tr><td rowspan="2">Module End</td><td colspan="2">Mode selection (/MODE0/1)</td></tr>
<tr><td>Mode 0</td><td>Mode 1</td></tr>
<tr><td>• Starts or interrupts program table operation (/START-STOP)
• Resets program table operation (/PGMRES)
• Program table selection 0 (/SEL0)
to
• Program table selection 7 (/SEL7)</td><td>• Starts homing (/HOME)
• Starts forward JOG operation (/JOGP)
• Starts reverse JOG operation (/JOGN)
• JOG speed table selection 0 (/JOG0)
to
• JOG speed table selection 3 (/JOG3)</td></tr>
<tr><td rowspan="2">Output</td><td>SERVOPACK End</td><td colspan="2">• Servo alarm (ALM)
• Error/warning (/WARN)
• Braking (/BK)
• Servo ready (/S-RDY)
• Alarm code output 0 to 2 (ALO0 to ALO2)</td></tr>
<tr><td>Module End</td><td colspan="2">• Positioning completed (/INPOSITION)
• Programmable output 0 to 7 (/POUT0 to /POUT7)</td></tr>
</table>

● Program Table Functions

Function		Setting Range	Setting Unit	Description
PGMSTEP	Program step	–	–	Program step number (0 to 255)
POS	Target position	–99,999,999 to +99,999,99	Reference unit	Specifies the target position. Absolute position (A), relative distance (I), infinite length forward/reverse (INFINITE), Stop (STOP), no motion command (–), continuous stop
SPD	Positioning speed	1 to 99,999,999	×1000 reference units/min	Specifies the positioning speed.
RDST	External positioning distance	0 to 99,999,999	Reference unit	Specifies registration distance. For no registration, set "–".
RSPD	External positioning speed	1 to 99,999,999	×1000 reference units/min	Specifies registration speed.
ACC	Acceleration	1 to 99,999,999	×1000 reference units/min/ms	Specifies acceleration for positioning or registration. To continue with the acceleration specified in the previously executed program step, set ":".
DEC	Deceleration	1 to 99,999,999	×1000 reference units/min/ms	Specifies deceleration for positioning or registration. To continue with the deceleration specified in the previously executed program step, set ":".
POUT	Programmable output signals	–	–	Specifies the operation of programmable output signals /POUT0 to /POUT7. Active (A), inactive (N), ZONE signal (Z), maintain previous condition (:)
EVENT	Pass condition	0 to 99,999 (Waiting time settings)	ms	Sets waiting time (Tn) and any one of the following in tandem: Positioning completion signal (I), position reference distribution completed signal (D), positioning near signal (N), or selection signal (SELn)
LOOP	Number of executions	1 to 99,999	–	Specifies the number of executions from positioning start to pass condition (EVENT).
NEXT	Program step to be executed next	0 to 255	–	Specifies the program step (PGMSTEP) to be executed next. To end program table operation, set "END".

External Dimensions of the INDEXER Option Module

● **External Dimensions** (Units: mm)



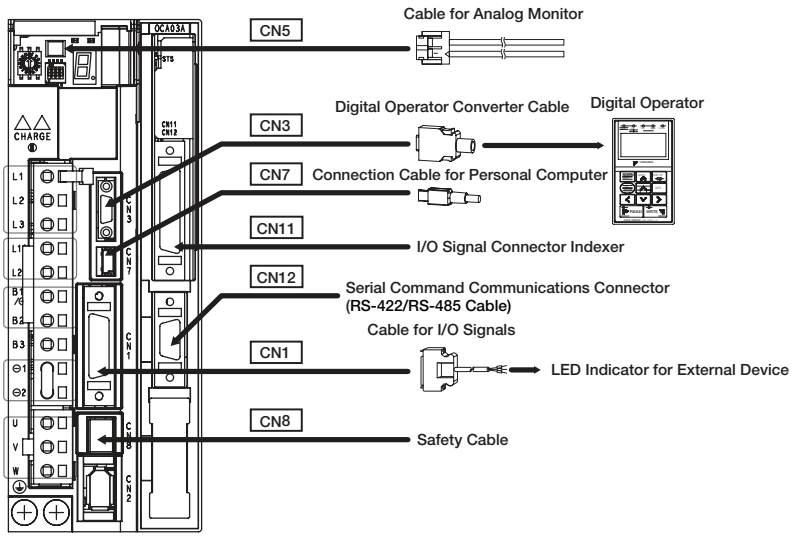
Approx. Mass: 0.2 kg

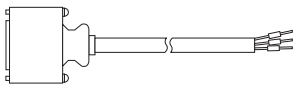
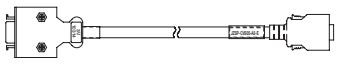
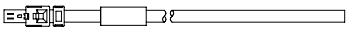
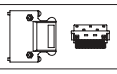
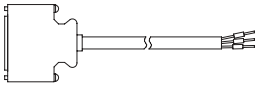
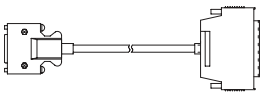
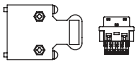
Port	Model	Pin	Manufacturer
CN11	10236-52A2PL	36	Sumitomo 3M Ltd.
CN12	10214-52A2PL	14	Sumitomo 3M Ltd.

Note: The connectors above or their equivalents are used for SERVOPACKs.

Selecting Cables

● Cables for CN1 CN3 CN5 CN7 CN8 CN11 CN12 for Command Option Attachable Type SERVOPACKs



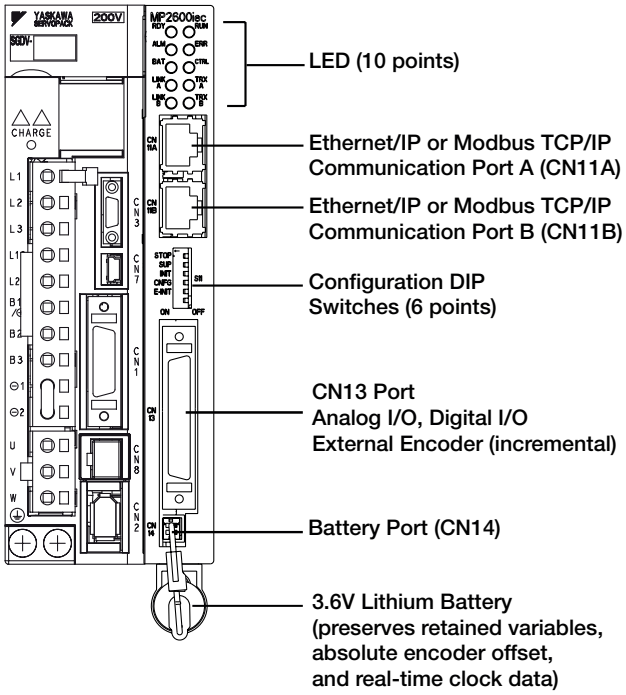
Name		Length	Order No.	Specifications
CN1 Cables for I/O Signals	Connector Kit		JZSP-CSI9-2-E	Soldered 
	Connector Terminal Converter Unit	0.5 m	JUSP-TA26P-E	Terminal Block and 0.5 m Connection Cable 
		1 m	JUSP-TA26P-1-E	
		2 m	JUSP-TA26P-2-E	
	Cable with Loose wire at One End	1 m	JZSP-CSI02-1-E	
		2 m	JZSP-CSI02-2-E	
		3 m	JZSP-CSI02-3-E	
CN3	Digital Operator		JUSP-OP05A-1-E	With Connection Cable (1 m) 
	Digital Operator Converter Cable*1	0.3 m	JZSP-CVS05-A3-E	Cable with Connectors at Both Ends 
CN5 Cables for Analog Monitor		1 m	JZSP-CA01-E	SERVOPACK End 
CN7 Connection Cables for Personal Computer		2.5 m	JZSP-CVS06-02-E	Cable with Connectors at Both Ends 
CN8 Cables for Safety Functions	Cables with Connector*2	3 m	JZSP-CVH03-03-E JZSP-CVH03-03-E-G3	
	Connector kit*3		Contact Tyco Electronics AMP K.K. Product name : Industrial Mini I/O D-shape Type1 Plug Connector Kit Model : 2013595-1	
CN11 I/O Signal Cable Indexer	Connector kit		DP9420007-E	
	Cable with Loose wire at One End	1 m	JZSP-CVI01-1-E	
		2 m	JZSP-CVI01-2-E	
		3 m	JZSP-CVI01-3-E	
	Cable with Connectors at Both Ends	0.5 m	JUSP-TA36V-E	
		1 m	JUSP-TA36V-1-E	
		2 m	JUSP-TA36V-2-E	
CN12 Cable for Serial Command	Connector kit		JZSP-CHI9-1	

*1 : A converter cable is required to use Σ-III series digital operators (model: JUSP-OP05A) for Σ-V series SERVOPACKs.
*2 : When using the safety function, connect this cable to the safety devices.
Even when not using the safety function, use SERVOPACKs with the Safe Jumper Connector (model: JZSP-CVH05-E) connected.
*3 : Use the connector kit when you make cables yourself.

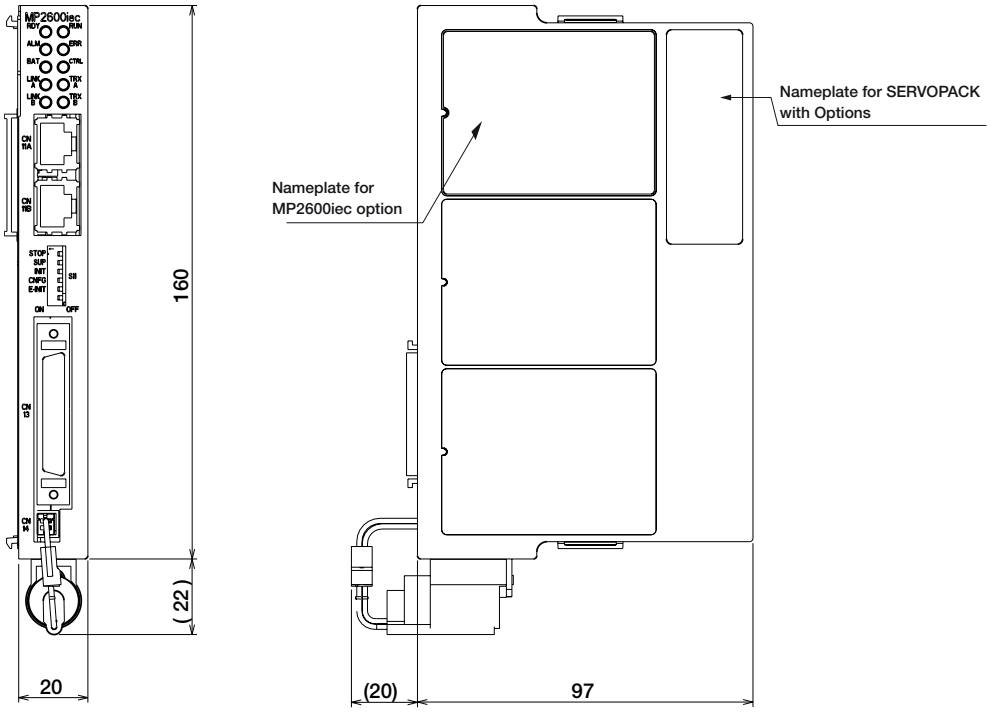
MP2600iec 1.5 Axis Motion Controller Option

The MP2600iec 1.5 Axis Motion Controller Option for the Sigma-5 amplifier provides a compact, all-in-one, servo/controller package with the following features:

- IEC61131-3 standardized programming environment with PLCopen function blocks for motion control.
- Auto-tuning, anti-vibration, and other high performance, easy-to-implement servo control features
- Ethernet/IP, Modbus TCP/IP, and OPC Server, which provide connectivity to PLCs, HMIs, SCADA, MES, and ERP
- Scalability with the multi-axis MP2000iec controller platform via the common programming environment, MotionWorks IEC
- Web server that allows for maintenance diagnostics and troubleshooting
- I/O features:
  - 15 digital inputs
  - 11 digital outputs
  - 1 analog input
  - 1 analog output
  - 1 external encoder input
  - 1 external encoder latch



● External Dimensions Units: mm



Dimensions in mm.

Specifications of the MP2600iec Single Axis Machine Controller Option

● General Specifications

Items		Specifications
Environmental Conditions	Ambient Operating Temperature	0 to 55°C
	Ambient Storage Temperature	-20°C to +85°C
	Ambient Operating Humidity	90% RH or less (with no condensation)
	Ambient Storage Humidity	90% RH or less (with no condensation)
	Protection Class/Pollution Degree	Protection class: IP10, Pollution degree: 2 An environment that satisfies the following conditions. • Free of corrosive or explosive gases • Free of exposure to water, oil or chemicals • Free of dust, salts or iron dust
	Operating Altitude	1,000 m above sea level or lower
Mechanical Operating Conditions	Vibration Resistance	4.9 m/s^2
	Shock Resistance	19.6 m/s^2
	Others	Free of static electricity, strong electromagnetic fields, magnetic fields or exposure to radioactivity

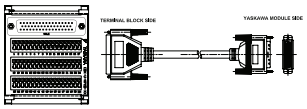
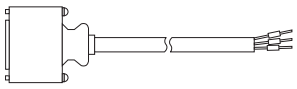
● Hardware Specifications

Items				Specifications
CPU				200 MHz, 32 bit, ARM 9
Memory		SDRAM		32 MB
		SRAM		512 kB with battery backup
		Flash		4 MB flash. Code and parameter storage
Operator interface		LED		10 LEDs (red and green - operating mode, communication and error status
		User Configuration		6x DIP switch (operating mode and communication configuration
User I/O	Controller Side (CN13)	Network		2x 100baseTX Ethernet
		Digital input		8 programmable inputs
		Digital output		8 programmable outputs
		Analog input		1 ch., +/- 10V, 16 bit
		Analog output		1 ch., +/- 10V, 16 bit
		Pulse Counter		RS-422-compatible pulse counter input (quadrature, pulse and direction, and up/down counter modes) with 5, 12, and 24V position latch inputs
	Servo Side (CN1)	Sequence Input	Allocated	Number of Inputs: 7 (1 registration input latches external encoder in 5 µs)
				Functions: The signal allocation and positive/negative logic can be modified. Forward run prohibited (P-OT), reverse run prohibited (N-OT), forward torque limit (/P-CL), reverse torque limit (/N-CL), general-purpose input signal (/SI0 to /SI6)
		Sequence Input	Fixed	Servo Alarm (ALM)
			Allocated	Number of Outputs: 3
				Functions: The signal allocation and positive/negative logic can be modified. Positioning completion (/COIN), speed coincidence detection(/V-CMP), servomotor rotation detection (/TGON), servo ready (/S-RDY), torque limit detection (/CLT), speed limit detection (VLT), brake (/BK), warning (/WARN), near (/NEAR)
Network capability				OPC (Client and Server required)
				Ethernet/IP
				Modbus/TCP
Programming standards				IEC61131/PLCopen
Diagnostic and configuration interface				Web interface
Motion control performance				1 controlled axis and one external encoder input plus virtual axis
Servo-Side Safety Functions	Input			/HWBB1, /HWBB2: Baseblock signal for power module
	Output			EDM1: Status monitor (fixed output) of built-in safety circuit

* Allocated I/O can also be used as programmable I/O.

Selecting Cables

● Cable Selection

Name		Length	Order No.	Specifications	Details
CN13 Cables for I/O Signals	Connector Kit		JZSP-CSI9-1-E	Soldered 	(1)
	Connector Terminal Converter Unit	0.5 m	CBK-U-MP2B-A5	Terminal Block and 0.5 m Connection Cable 	(2)
		1 m	CBK-U-MP2B-01		
		3 m	CBK-U-MP2B-03		
	Flying Lead Cable	0.5 m	CFC-U-MP2B-A5		(3)
		1 m	CFC-U-MP2B-01		
		3 m	CFC-U-MP2B-03		
CN11A CN11B Ethernet/EtherCAT Cables for Industrial Use			Category: CAT5e Shield specifications: S/UTP or S/STP Cable length: 50 m maximum		

(1) Connector Kit for CN13

Use the following connector and cable to assemble the cable. The CN13 connector kit includes one case and one connector.

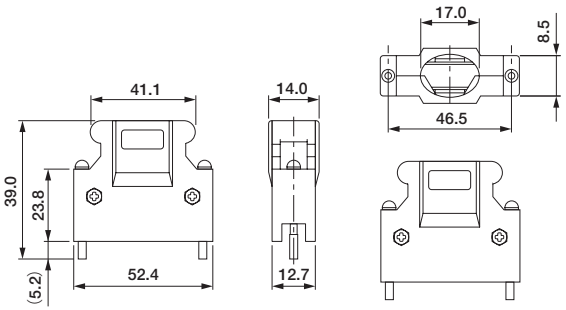
Connector Kit Model	Case		Connector	
	Model	Qty	Model	Qty
JZSP-CSI9-1-E	10350-52Z0-008*	1 set	10150-3000PE* (Soldered)	1

* : Manufactured by Sumitomo 3M Ltd.

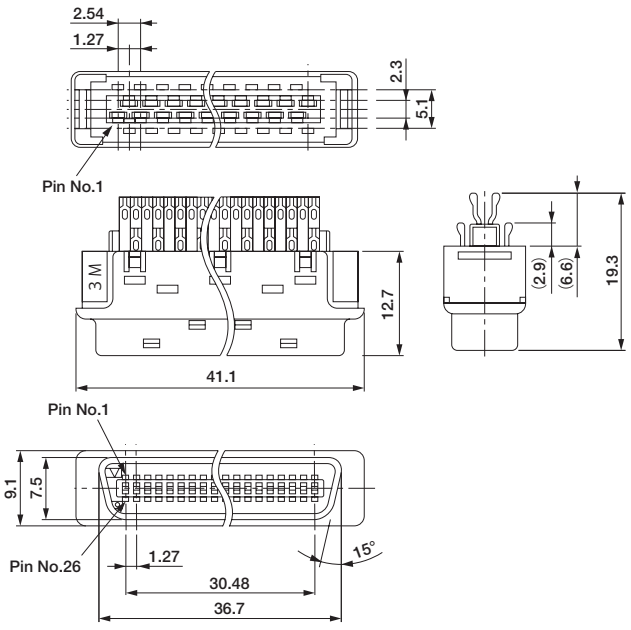
· Cable Size

Item	Specifications
Cable	Use twisted-pair or twisted-pair shielded wire.
Applicable Wires	AWG 24, 26, 28, 30
Cable Finished Diameter	16 dia. max.

· Dimensional Drawings of Case

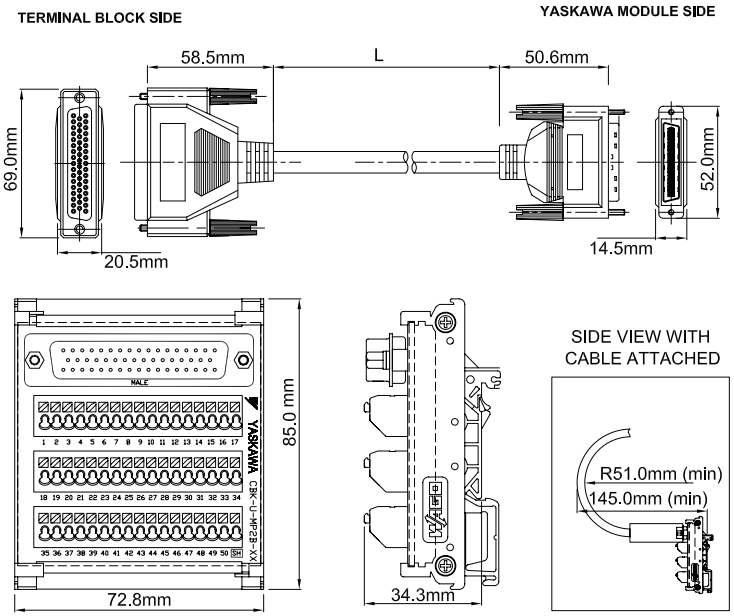


· Dimensional Drawings of Connector



Selecting Cables

(2) Connector Terminal Converter Unit for CN13



ITEM#	L = LENGTH (mm)
CBK-U-MP2B-A5	500 +/- 38.1
CBK-U-MP2B-01	1000 +/- 38.1
CBK-U-MP2B-03	3000 +/- 38.1

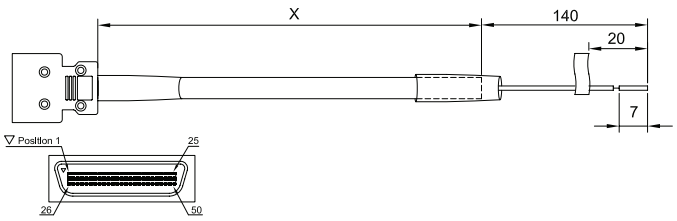
CABLE SPECIFICATION (mm)	
OUTER DIAMETER	8.5 +/- 0.1mm
BENDING RADIUS	6 x O.D. MINIMUM 15 x O.D. FOR LONG TERM RELIABILITY

CBK-U-MP2B-XX Function Chart for MP2600iec

Pin No.	Signal Name	I/O	Function
1	AO	O	Analog output
2	AI	I	Analog input
3	-	-	-
4	PA+	I	Phase A pulse (+)
5	PA-	I	Phase A pulse (-)
6	GND	P	Encoder input ground
7	BAT+	P	Controller SRAM Battery (+)
8	-	-	-
9	PILC5V	I	Phase-C latch pulse (-) for 5VDC input
10	PILC24V	I	Phase-C latch pulse (-) for 24VDC input
11	DO_00-	O	Digital output 0 (-)
12	DO_02-	O	Digital output 2 (-)
13	DICOM	I	Digital input common
14	DI_00	I	Digital input 0
15	DI_02	I	Digital input 2
16	DI_04	I	Digital input 4
17	DI_06	I	Digital input 6
18	DO_04-	O	Digital output 4 (-)
19	DO_06-	O	Digital output 6 (-)
20	-	-	-
21	DO_00+	O	Digital output 0 (+)
22	DO_02+	O	Digital output 2 (+)
23	DO_04+	O	Digital output 4 (+)
24	DO_06+	O	Digital output 6 (+)
25	-	-	-
26	AO_GND	O	Analog output ground
27	AI_GND	I	Analog input ground
28	-	-	-
29	PB+	I	Phase B pulse (+)
30	PB-	I	Phase B pulse (-)
31	GND	P	Encoder input ground
32	BAT-	P	Controller SRAM Battery (-)
33	-	-	-
34	PILC12V	I	Phase-C latch pulse (-) for 12VDC input
35	PIL	I	Phase-C latch pulse (+)
36	DO_01-	O	Digital output 1 (-)
37	DO_03-	O	Digital output 3 (-)
38	DICOM	I	Digital input common
39	DI_01	I	Digital input 1 - shared with pulse latch input
40	DI_03	I	Digital input 3
41	DI_05	I	Digital input 5
42	DI_07	I	Digital input 7
43	DO_05-	O	Digital output 5 (-)
44	DO_07-	O	Digital output 7 (-)
45	-	-	-
46	DO_01+	O	Digital output 1 (+)
47	DO_03+	O	Digital output 3 (+)
48	DO_05+	O	Digital output 5 (+)
49	DO_07+	O	Digital output 7 (+) - shared w/ position agreement COIN signal
50	-	-	-

I = Input, O = Output, P = Power

(3) Flying Lead Cable for CN13



ITEM NUMBER	X = LENGTH (mm)
CFC-U-MP2B-A5	500
CFC-U-MP2B-01	1000
CFC-U-MP2B-03	3000

CABLE SPECIFICATION (mm)	
OUTER DIAMETER	8.1
BENDING RADIUS	12 O.D.

CFC-U-MP2B-XX Function Chart for MP2600iec

Pin No.	Color (Solid/Band)	Signal Name		Function
1	BLK/RED	AO	O	Analog output
2	BLK/WHT	AI	I	Analog input
3	RED/GRN	-	-	-
4	BLK/BLU	PA+	I	Phase A pulse (+)
5	BLU/BLK	PA-	I	Phase A pulse (-)
6	RED/BLU	GND	P	Encoder input ground
7	RED/WHT	BAT+	P	Controller SRAM Battery (+)
8	BLK/GRN	-	-	-
9	BLK/YEL	PILC5V	I	Phase-C latch pulse (-) for 5VDC input
10	BLK/ORG	PILC24V	I	Phase-C latch pulse (-) for 24VDC input
11	RED/YEL	DO_00-	O	Digital output 0 (-)
12	RED/BRN	DO_02-	O	Digital output 2 (-)
13	RED/ORG	DICOM	I	Digital input common
14	GRN/WHT	DI_00	I	Digital input 0
15	GRN/BLU	DI_02	I	Digital input 2
16	GRN/YEL	DI_04	I	Digital input 4
17	GRN/BRN	DI_06	I	Digital input 6
18	GRN/ORG	DO_04-	O	Digital output 4 (-)
19	WHT/BLU	DO_06-	O	Digital output 6 (-)
20	WHT/YEL	-	-	-
21	YEL/RED	DO_00+	O	Digital output 0 (+)
22	BRN/RED	DO_02+	O	Digital output 2 (+)
23	ORG/GRN	DO_04+	O	Digital output 4 (+)
24	BLU/WHT	DO_06+	O	Digital output 6 (+)
25	WHT/BRN	-	-	-
26	RED/BLK	AO_GND	O	Analog output ground
27	WHT/BLK	AI_GND	I	Analog input ground
28	GRN/RED	-	-	-
29	BLK/BRN	PB+	I	Phase B pulse (+)
30	BRN/BLK	PB-	I	Phase B pulse (-)
31	BLU/RED	GND	P	Encoder input ground
32	WHT/RED	BAT-	P	Controller SRAM Battery (-)
33	GRN/BLK	-	-	-
34	ORG/BLK	PILC12V	I	Phase-C latch pulse (-) for 12VDC input
35	YEL/BLK	PIL	I	Phase-C latch pulse (+)
36	WHT/ORG	DO_01-	O	Digital output 1 (-)
37	BLU/YEL	DO_03-	O	Digital output 3 (-)
38	ORG/RED	DICOM	I	Digital input common
39	WHT/GRN	DI_01	I	Digital input 1 - shared with pulse latch input
40	BLU/GRN	DI_03	I	Digital input 3
41	YEL/GRN	DI_05	I	Digital input 5
42	BRN/GRN	DI_07	I	Digital input 7
43	BLU/BRN	DO_05-	O	Digital output 5 (-)
44	BLU/ORG	DO_07-	O	Digital output 7 (-)
45	YEL/WHT	-	-	-
46	ORG/WHT	DO_01+	O	Digital output 1 (+)
47	YEL/BLU	DO_03+	O	Digital output 3 (+)
48	BRN/BLU	DO_05+	O	Digital output 5 (+)
49	ORG/BLU	DO_07+	O	Digital output 7 (+) - shared w/ position agreement COIN signal
50	BRN/WHT	-	-	-

I = Input, O = Output, P = Power

Option Modules for all SERVOPACKs

Model Designations

SGDV (Note) R70 A 01 A 000 00 0 001

Σ-V Series
SGDV SERVOPACK

Current

Voltage	Code	Applicable Servomotor Max. Capacity kW
230 V	R70***	0.05
	R90***	0.1
	1R6***	0.2
	2R8***	0.4
	3R8	0.5
	5R5***	0.75
	7R6	1.0
	120 ♣	1.5
	180	2.0
	200	3.0
	330	5.0
	470	6.0
	550	7.5
	590	11
	780	15
400V	1R9	0.5
	3R5	1.0
	5R4	1.5
	8R4	2.0
	120	3.0
	170	5.0
	210	6.0
	260	7.5
	280	11
	370	15

*** These amplifiers can be powered with single or three-phase.
♣ SGDV-120A□□A008000□□□, a special version of the 1.5kW amplifier can be used for single-phase operation.

Voltage

Code	Specifications
A	230 VAC
D	400 VAC

Interface

Code	Specifications
01	Analog voltage/pulse train reference type (for rotary servomotors)
05	Analog voltage/pulse train reference type (for linear servomotors)
11	MECHATROLINK-Ⅱ communications reference type (for rotary servomotors)
15	MECHATROLINK-Ⅱ communications reference type (for linear servomotors)
21	MECHATROLINK-Ⅲ communications reference type (for rotary servomotors)
25	MECHATROLINK-Ⅲ communications reference type (for linear servomotors)
E1	Command Option Attachable Type (for rotary servomotors)
E5	Command Option Attachable Type (for linear servomotors)

Design Revision Order
A, B…

Options (hardware)

Code	Specifications
000	Base-mounted (standard)
001	Rack-mounted*1
002	Varnished
003	Rack-mounted*1 and Varnished
008	Single-phase 230 V AC input (model: SGDV□120A1A008000)
020	Dynamic brake (400V SERVOPACKs only)

Options (software)

Code	Specifications
00	standard

Options (parameter)

Code	Specifications
0	standard

Option Module

Code	Specifications
001	Option module for fully-closed loop control
010	Safety module
□□□	Universal Feedback Card Type 1
□□□	Universal Feedback Card Type 2

Note: The model number of a SERVOPACK with option modules is not hyphenated after SGDV.
*1 : SERVOPACKs of 6 kW or more are duct-ventilated.

Features

● Superlative expandability achieved by option module method.

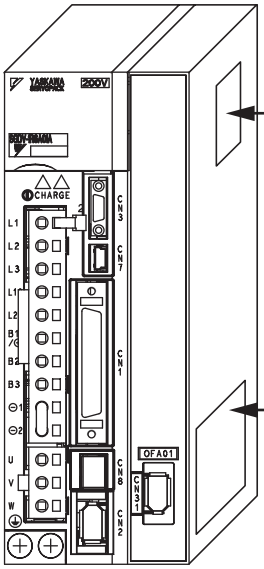
(1) Option Module 1 (command option): compatible with various communication interfaces.

(2) Option Module 2 (safety): compatible with EN60204-1 stop category 1 and 2
(stop category 0 is standard)

(3) Option Module 3 (feedback): compatible with fully-closed loop control

Precautions

<Combination Example>



Nameplate for SERVOPACK with Option Module

Model (20 digits) : SGDV1R6A01A000000001

Indicates the combination of SGDV-1R6A01A SERVOPACK and SGDV-OFA01A option module for fully-closed loop control.

Nameplate for SERVOPACK
Model: SGDV-1R6A01A
(Refer to *Model Designations* provided in the SERVOPACK pages for details.)

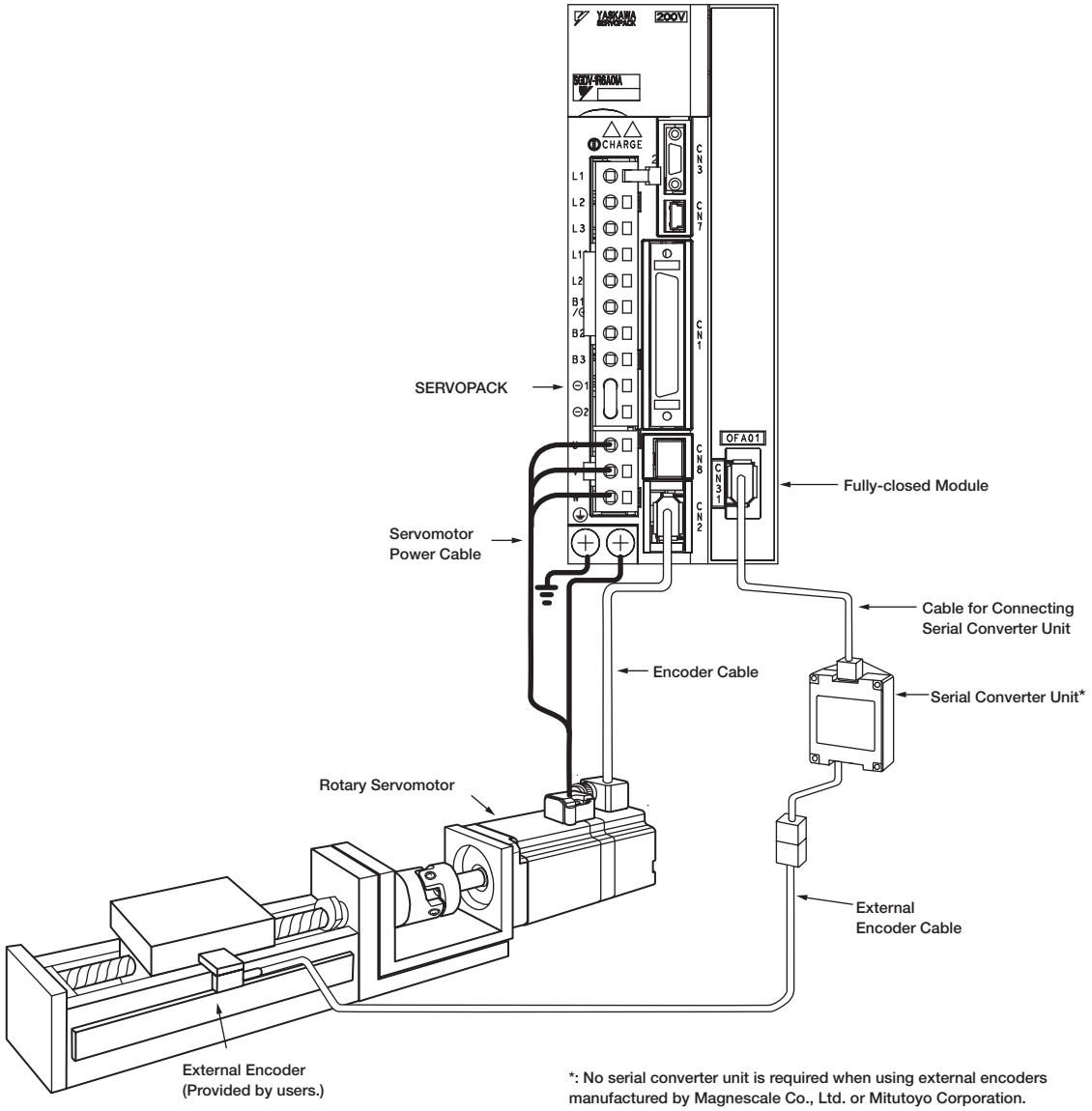
Nameplate for Option Module for Fully-closed Loop Control
Model: SGDV-OFA01A
(This model number is shown on the nameplate for option module for fully-closed loop control)

Option Module for Fully-closed Loop Control

● System Configuration for Fully-closed Loop Control

A Fully-closed Module is required when using rotary servomotors with fully-closed loop control. Install the module on the SERVOPACK before using it.

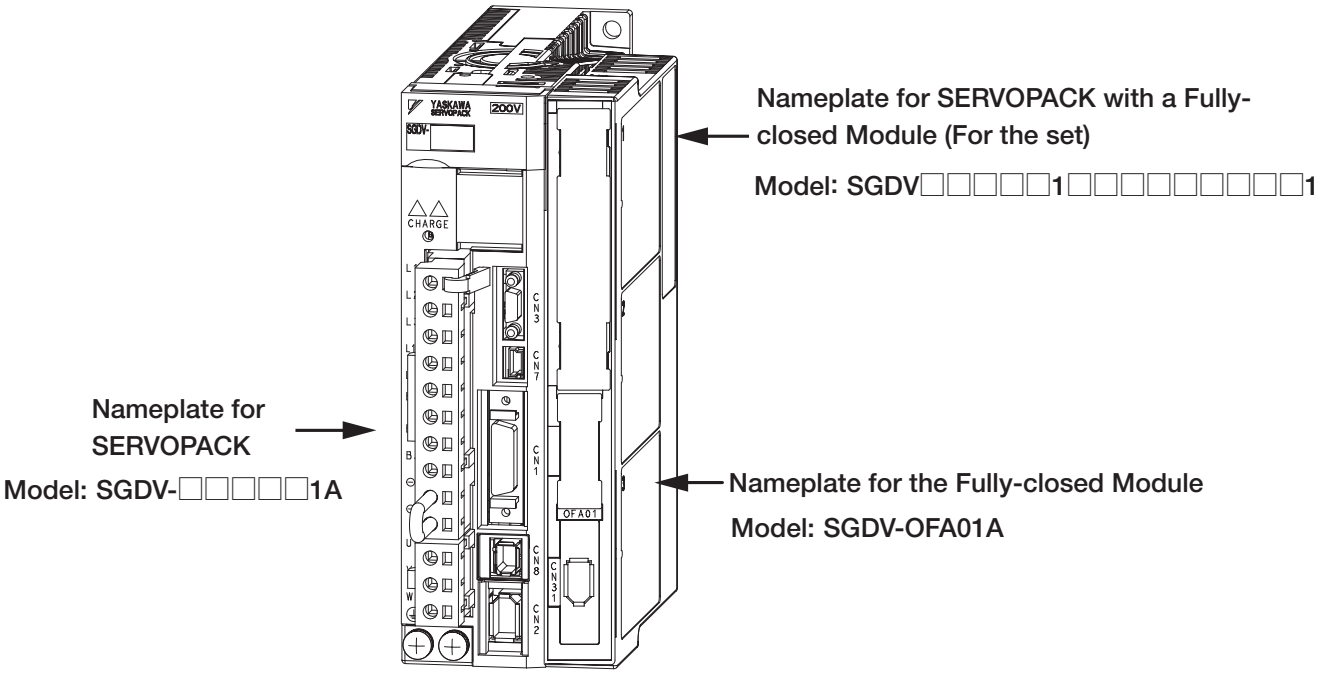
- High-precision and high-response positioning with using position feedback from a detector (such as an external encoder) installed on the machine.
- High resolution with external encoders (linear scales)



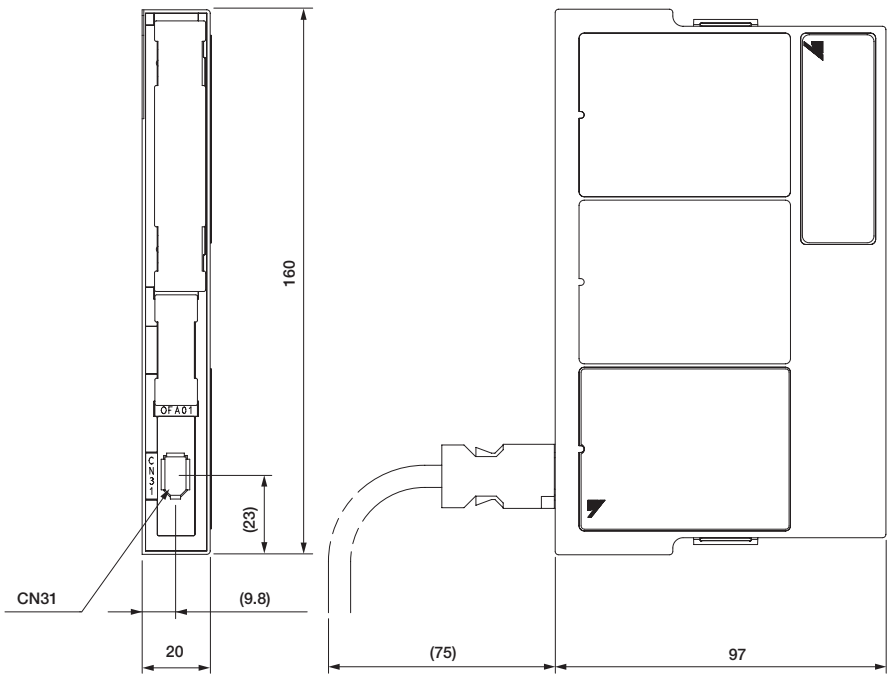
*: No serial converter unit is required when using external encoders manufactured by Magnescale Co., Ltd. or Mitutoyo Corporation.

● Model Designation

SGDV-OFA01A



External Dimensions Units: mm



Approx. Mass: 0.1 kg

Connector

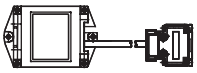
Port	Model	Pin	Manufacturer
CN31	53984-0671	6	Molex Japan Co., Ltd.

Note: The connectors above or their equivalents are used for SERVOPACKs.

Serial Converter Units

● Model Designations

JZDP - D00□ - 000 - E

Serial Converter Unit Model			
Code	Appearance	Applicable External Encoder	Hall Sensor
D003		Manufactured by HEIDENHAIN Corporation	None
D005		Manufactured by Renishaw plc.	None

Note: Using the serial converter unit JZDP-A□□□ with SGDV SERVOPACK will void our guarantee.

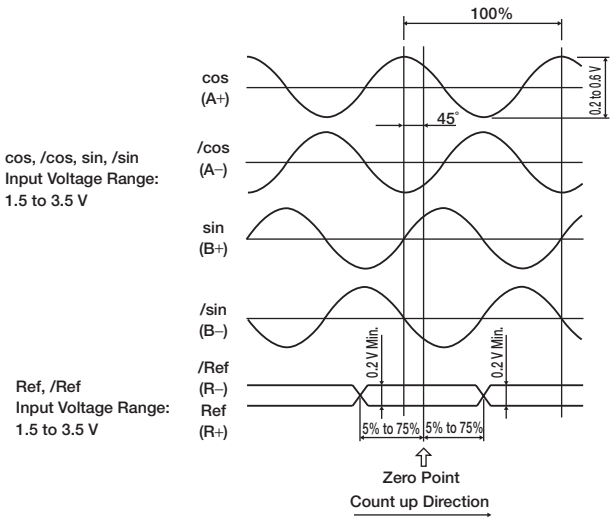
Characteristics and Specifications

Items		JZDP-D00□-000-E
Electrical Characteristics	Power Supply Voltage	+5.0 V±5%, ripple content 5% max.
	Current Consumption*1	120 mA typ. 350 mA max.
	Signal Resolution	Input two-phase sine wave: 1/256 pitch
	Max. Response Frequency	250 kHz
	Analog Input Signals*2 (cos, sin, Ref)	Differential input amplitude: 0.4 to 1.2 V Input signal level: 1.5 to 3.5 V
	Output Signal*3	Position data, alarms
	Output Method	Serial data communications
	Output Circuit	Balanced type transceiver (SN75LBC176 or the equivalent), internal terminating resistor: 120 Ω
Mechanical Characteristics	Approx. Mass	150 g
	Vibration Resistance	98 m/s2 max. (10 to 2500 Hz) in three directions
	Impact Resistance	980 m/s2, (11 ms) two times in three directions
Environmental Conditions	Surrounding Air Temperature	0 to 55°C
	Storage Temperature	–20 to 80°C
	Humidity	20% to 90%RH (no condensation)

*1: The current consumption of the linear scale and hall sensor is not included in this value.
The current consumption of linear scale and hall sensor must be taken into consideration for the current capacity of host controller that supplies the power.
The current consumption of hall sensor: Approx. 40 mA.
*2: Input a value within the specified range. Otherwise, incorrect position information is output, and the device may be damaged.
*3: The transmission is enabled 100 to 300 ms after the power turns on.

● Analog Signal Input Timing

The following figure shows the input timing of the analog signals.
When the cos and sin signals are shifted 180 degrees, the differential signals are the /cos and /sin signals.
The specifications of the cos, /cos, sin, and /sin signals are identical except for the phase.
Input the signals Ref and /Ref so that they shall cross each other as shown in the figure because they are input into the converter.
When they are crossed, the output data will be counted up.



IMPORTANT

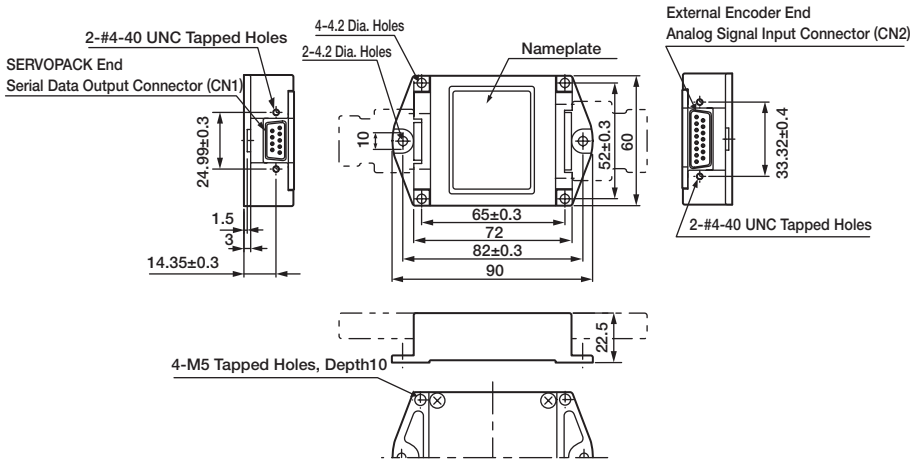
• Precautions

1 Never perform insulation resistance and withstand voltage tests.
2 When analog signals are input to the serial converter unit, noise influence on the analog signals affects the unit's ability to output correct position information. The analog cable must be as short as possible and shielded.
3 Do not connect or disconnect the unit while power is being supplied, or the unit may be damaged.
4 When using multiple axes, use a shield cable for each axis. Do not use a shield cable for multiple axes.

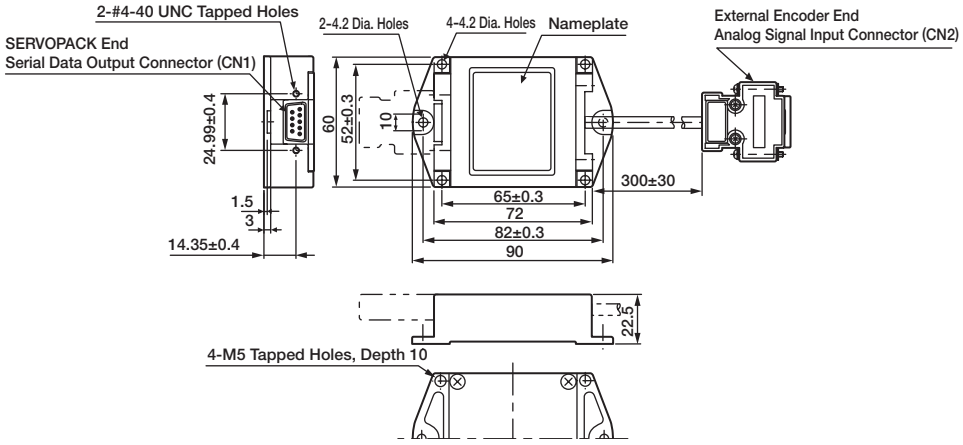
Serial Converter Units Units: mm

● External Dimensions

(1) Model: JZDP-D003-000-E



(2) Model: JZDP-D005-000-E



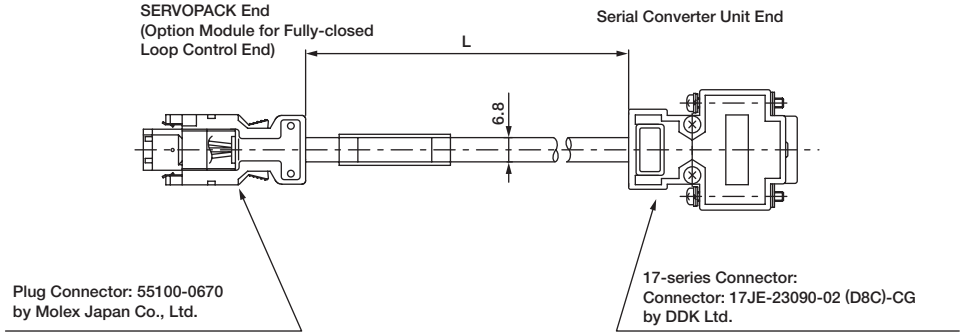
● Connection Cables

• Recommended Cables

Name	Application	Model	Length
Cable for Connecting Serial Converter Unit	Connection between SERVOPACK (Option module for fully-closed loop control) connector CN31 and serial converter unit	JZSP-CLP70-03-E-G#	3 m
		JZSP-CLP70-05-E-G#	5 m
		JZSP-CLP70-10-E-G#	10 m
		JZSP-CLP70-15-E-G#	15 m
		JZSP-CLP70-20-E-G#	20 m

Note: The digit "#" of the order number represents the design revision.

• Dimensional Drawing

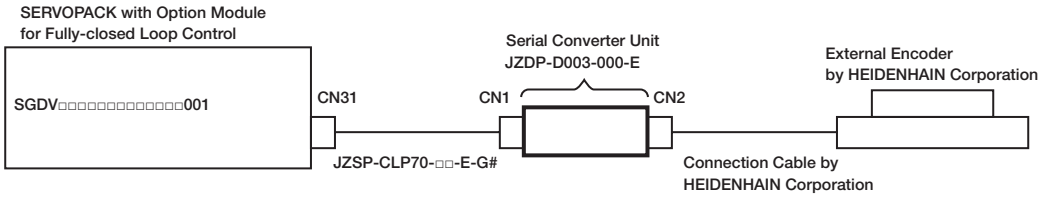


Serial Converter Units

● Connection Examples

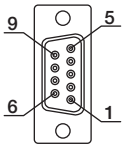
(1) Connection Example with External Encoder by HEIDENHAIN Corporation

• Model: JZDP-D003-000-E



Pin No.	Signal
1	+5V
2	Phase S output
3	Not used
4	Not used
5	0V
6	Phase /S output
7	Not used
8	Not used
9	Not used
Case	Shield

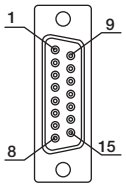
CN1
SERVOPACK End
Serial Data Output



17-series Connector:
17LE-13090-27-FA
(Socket) by DDK Ltd.

Pin No.	Signal
1	cos input (A+)
2	0V
3	sin input (B+)
4	+5V
5	Not used
6	Not used
7	/Ref input (R–)
8	Not used
9	/cos input (A–)
10	0V sensor
11	/sin input (B–)
12	5V sensor
13	Not used
14	Ref input (R+)
15	Not used
Case	Shield

CN2
External Encoder End
Analog Signal Input

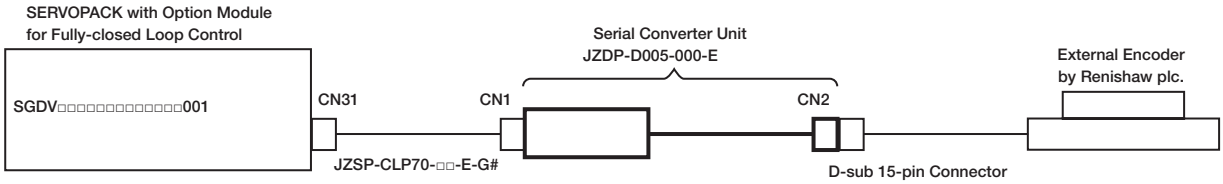


17-series Connector:
17LE-13150-27-FA
(Socket) by DDK Ltd.

Notes: 1 Do not use the unused pins.
2 The external encoder (analog 1 Vp-p output, D-sub 15-pin) by HEIDENHAIN Corporation can be directly connected.

(2) Connection Example with External Encoder by Renishaw plc.

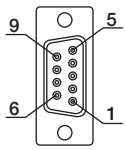
• Model : JZDP-D005-000-E



Pin No.	Signal
1	+5V
2	Phase S output
3	Not used
4	Not used
5	0V
6	Phase /S output
7	Not used
8	Not used
9	Not used
Case	Shield

SERVOPACK does not have
the function to process Vq signals.

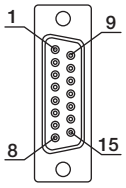
CN1
SERVOPACK End
Serial Data Output



17-series Connector:
17LE-13090-27-FA
(Socket) by DDK Ltd.

Pin No.	Signal
1	/cos input (V1–)
2	/sin input (V2–)
3	Ref input (V0+)
4	+5V
5	5Vs
6	Not used
7	Not used
8	Not used
9	cos input (V1+)
10	sin input (V2+)
11	/Ref input (V0–)
12	0V
13	0Vs
14	Not used
15	Inner (0V)
Case	Shield

CN2
External Encoder End
Analog Signal Input

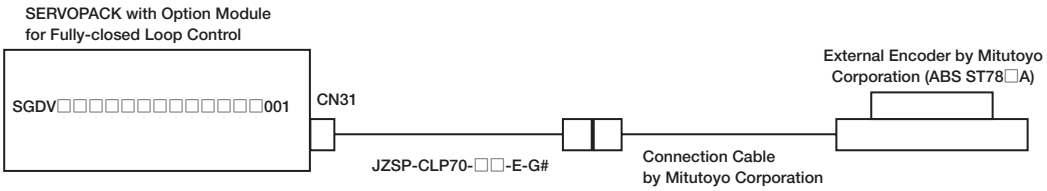


17-series Connector:
17JE-13150-02 (D8C) A-CG
(Socket) by DDK Ltd.

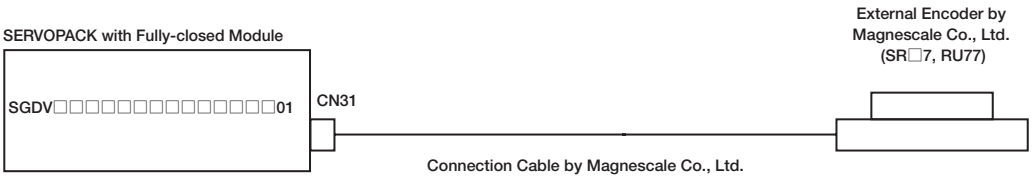
Notes: 1 Do not use the unused pins.
2 The external encoder (analog 1 Vp-p output, D-sub 15-pin) by Renishaw plc. can be directly connected. However, the BID and DIR signals are not connected.
3 Use the external encoder-end connector to change the home position specifications of the external encoder.

Serial Converter Units

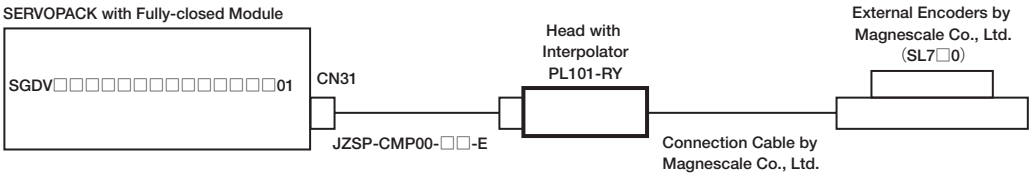
(3) Connection Example with External Encoder by Mitutoyo Corporation (Model: ABS ST78□A)
When using this external encoder, serial converter units are not required.



(4) Connection Example with External Encoders by Magnescale Co., Ltd. (Model: SR7, RU77)
When using this external encoders, serial converter units are not required.



(5) Connection Example with External Encoders by Magnescale Co., Ltd. (Model: SL7□0)
When using this external encoders, serial converter units are not required.

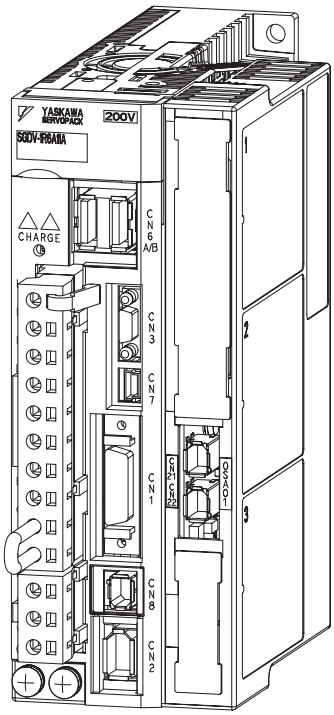


Safety Module

● Functional safety for Sigma-5 servo drives

Features

- Machine movements represent a major source of hazard for operators and staff members carrying out maintenance tasks. The potential dangers posed by these movements affect the operational safety of machines and installations and have to be included in safety considerations.
- Besides the protective equipment which is required in normal operation mode, there are more situations in which machine operators must be protected by mechanisms internal to the drive and the control unit: safe machine states are necessary during commissioning, setup mode and troubleshooting. Occasionally it might even be necessary for persons to work in the processing area of machines during operation of machines and installations.
- Avoiding injury to persons in these situations and ensuring the safe operation of a machine during all possible operating states is absolutely essential.
- Highly dynamic motion control applications require fast reaction times and real-time capable communication of the safety technology to prevent uncontrolled movements if an error occurs. Integrated safety functions ensure protection for the operator without affecting the performance of the machine.
- Compared to conventional safety technology, the integrated safety technology (STO, safe torque off) and the advanced safety option of the Sigma-5 servo drives considerably increase the functionality and availability of your machine.



The Sigma-5-series Safety Module is an Option Module that is connected to a Sigma-5-series SERVOPACK. The Safety Module is equipped with four functions to provide machine safety. These functions reduce risks during usage of the machine by protecting people from hazardous operations of movable machine parts. The stopping function that is defined in functional safety standards can be achieved with these four functions. By using the Hard Wire BaseBlock function of the SERVOPACK, the four safety functions described on the next page, which are defined in functional safety standards, can be achieved.

● Model Designation

SGDV – OS A01 A

Series	
SGDV	Σ-V Series

1st + 2nd digits: Module Type	
Code	Module
OS	Safety option module

3rd + 4th + 5th digits: Interface Specifications	
Code	Interface
A01	Safety module

6th digit: Design Revision Order

NOTE: Mounting of Option Modules on Amplifiers with Interface Option E1 and E5 requires mounting kit SGDV-OZA01A (metal bar, mounting screws and cover).

Applicable Standards and Functions

Compliance with Safety Standards

Safety Standards	Applicable Standards	Products	
		SERVOPACK	SERVOPACK + Safety Module
Safety of Machinery	EN ISO13849-1:2008 EN 954-1 IEC 60204-1	❍	❍
Functional Safety	IEC 61508 Series IEC 62061 IEC 61800-5-2	❍	❍
EMC	IEC 61326-3-1	❍	❍

The module is designed to meet the following safety standards:
• IEC and EN 61508: Functional safety of safety-related electric, electronic and programmable electronic systems
• IEC and EN 62061: Safety of machinery, Functional safety of safety-related electrical, electronic and programmable electronic control systems
• ISO and EN ISO 13849-1: Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design
• IEC and EN 61800-5-2: Adjustable speed electrical power drive systems - Part 5-2: Safety requirements - Functional

System Configurations

● System Configuration When Using the Safety Module

Name			Model	Ref. Page
Option Module Only		SERVOPACK		
		Analog Voltage/Pulse Train Reference	SGDV-□□□□0□A	Page 231
		MECHATROLINK-Ⅱ Communications Reference	SGDV-□□□□1□A	Page 243
		Command Option Attachable Type	SGDV-□□□□E□A	Page 263
		Safety Module	SGDV-OSA01A	Page 339
		Option Case Kit	SGDV-OZA01A Note: One option case kit is required for each SERVOPACK.	
Rotary Servomotor		SGMJV model	SGMJV-□□□□□□□	Page 1
		SGMAV model	SGMAV-□□□□□□□	Page 15
		SGMEV model	SGMPS-□□□□□□□	Page 31
		SGMGV model	SGMGV-□□□□□□□	Page 45
		SGMSV model	SGMSV-□□□□□□□	Page 69
		SGMCS model	SGMCS-□□□□□□□	Page 97
	Cable	Servomotor Main Circuit Cable	Refer to Selecting Cables in this catalog for details of cables for individual models of rotary servomotors.	
		Encoder Cable		
Linear Servomotors		SGLGW model	SGLGW-□□□□□□□□□	Page 115
		SGLFW model	SGLFW-□□□□□□□□□	Page 131
		SGLTW model	SGLTW-□□□□□□□□□	Page 151
		SGLC model	SGLC-□□□□□□□□□-□□□□	Page 179
	Cable	Linear Servomotor Main Circuit Cable	Refer to Selecting Cables in this catalog for details of cables for individual models of linear servomotors.	
		Cable for Connecting Linear Scales		
		Cable for Connecting Serial Converter Unit		
		Cable for Connecting Hall Sensor		
Serial Converter Units		Encoders by Heidenhain Corporation	JZDP-D003-□□□-E, JZDP-D006-□□□-E	Page 335
			JZDP-G003-□□□-E, JZDP-G006-□□□-E	
		Encoders by Renishaw Plc.	JZDP-D005-□□□-E, JZDP-D008-□□□-E	
			JZDP-G005-□□□-E, JZDP-G008-□□□-E	
	Cable	Cable for Connecting Serial Converter Unit	JZSP-CLP70-□□-E-G#	Page 336

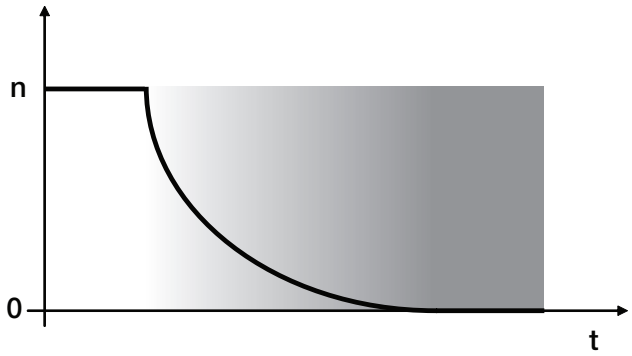
Note: 1. The following encoders cannot be connected to SERVOPACKs with a Safety Module.
- External encoders by Mitutoyo Corporation: ABS ST78□A□
- External encoders by Magnescale Co., Ltd. (Formerly Sony Manufacturing Systems Corporation) : SL7□0, SR□7, and RU77

2. The following option modules cannot be used with SERVOPACKs with a Safety Module.
- Option module for fully-closed loop control
- INDEXER option module

3. MECHATROLINK-III communications reference SERVOPACKs cannot be used with the Safety Module.
4. The digit "#" of the order number represents the design version.

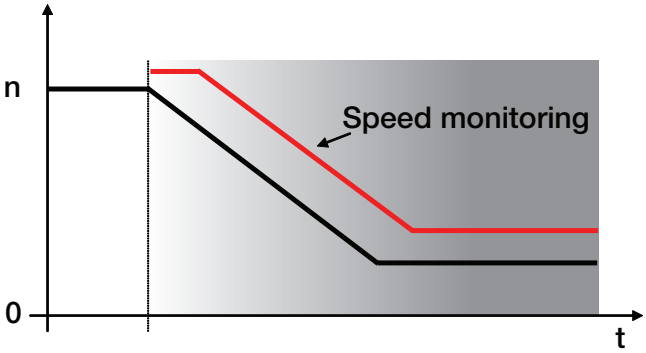
Safety functions

Safe BaseBlock Function (SBB)
Safe Torque Off (STO)



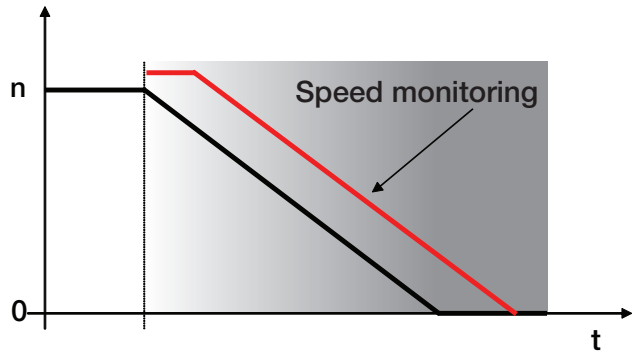
This safety function is equivalent to the **Safe Torque Off (STO)** function defined in IEC 61800-5-2.
Prevents torque from being generated by the motor.
This function is integrated within the drive itself as standard.
It shuts OFF the power supply to the motor by executing the HWBB function of the SERVOPACK according to the state of the input signals.

Safely Limited Speed with Delay Function (SLS-D)
Safely Limited Speed (SLS)



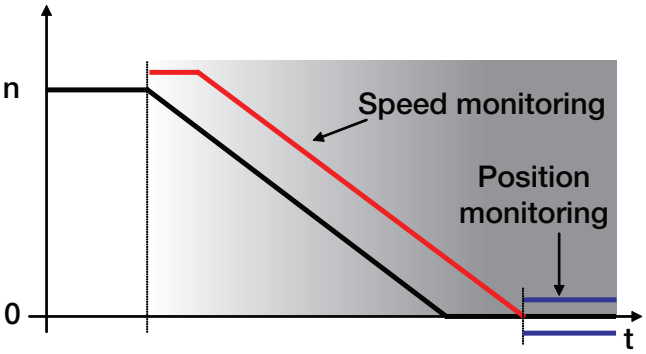
This safety function is equivalent to the **Safely-Limited Speed (SLS)** function defined in IEC 61800-5-2.
Prevents the motor from exceeding a programmable speed limit.
The safety input enables the SERVOPACK monitoring of the deceleration, then it monitors the motor speed.
This function monitors the deceleration of the motor until the specified time according to the state of the input signal. It monitors the motor speed to make sure that it is within the allowable range.

Safe BaseBlock with Delay Function (SBB-D)
Safe Stop 1 (SS1)



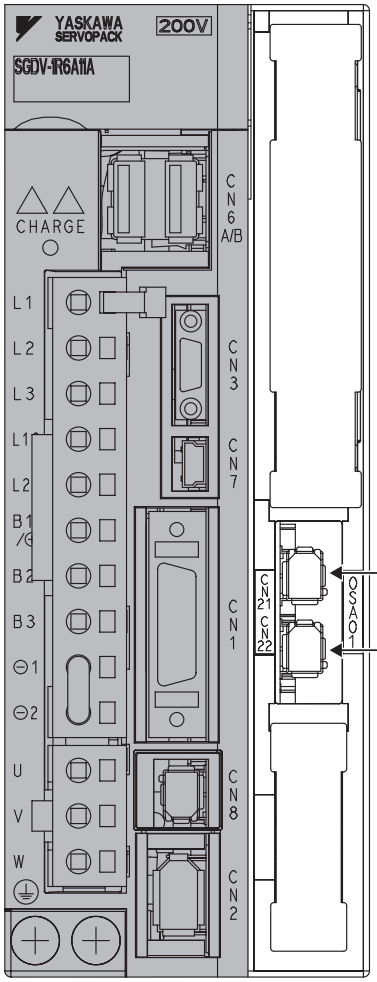
This safety function is equivalent to the **Safe Stop 1 (SS1)** function defined in IEC 61800-5-2.
Initiates motor deceleration and executes Safe Torque Off function after a specified time delay. In the event of any fault, Safe Torque Off is initiated.
Monitors the deceleration of the motor until the specified time according to the state of the input signal. It shuts OFF the power supply to the motor by executing the HWBB function of the SERVOPACK.
2 operation modes can be set:
Monitoring only or Controlling & Monitoring.
Active Mode: SERVOPACK controls motor deceleration and monitors the deceleration operation.

Safe Position Monitor with Delay Function (SPM-D)
Safe Stop 2 (SS2)



This safety function is equivalent to the **Safe Stop 2 (SS2)** function defined in IEC 61800-5-2.
Initiates and monitors the deceleration of the motor. At standstill, or after a programmable delay, the Safe Operating Stop function is applied.
Starts deceleration of the motor and prevents the motor from stopping at a distance greater than the allowable deviation from the specified position after a specified time has passed.
Monitors the deceleration of the motor until the specified time according to the state of the input signal. It monitors the position after the motor has stopped.
2 operation modes can be set:
Monitoring only or Controlling & Monitoring.
Active Mode: SERVOPACK controls motor deceleration and monitors the deceleration operation, then it switches to position monitoring.
A holding brake cannot be made redundant.

Part names of the safety module



Connector

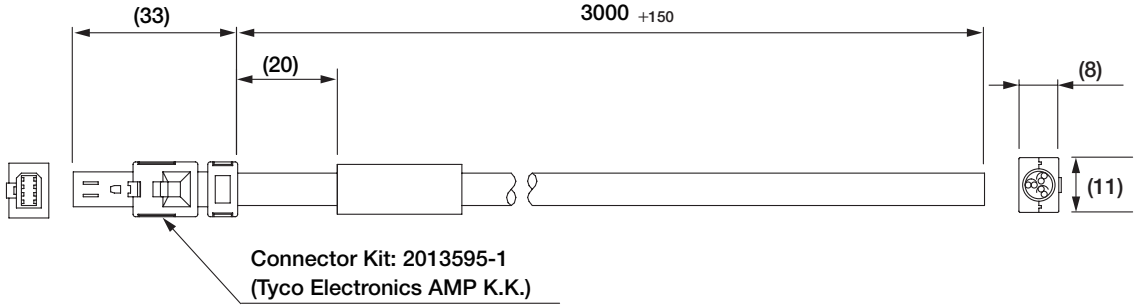
Port	Model	Pin	Manufacturer
CN21	1981080-1	8	Tyco Electronics AMP K.K.
CN22	1981080-1	8	Tyco Electronics AMP K.K.

Note: 1. The connectors above or their equivalents are used for SERVOPACKs.
2. Refer to the user's manual of the Safety Module for information on installation standards.

Signal	Pin No.	Name	Function
–	1	–	–
–	2	–	–
/SRI-A1-	3	Safety Request Input Signal A1	Input signal for Safety Function A
/SRI-A1+	4		
/SRI-A2-	5	Safety Request Input Signal A2	
/SRI-A2+	6		
EDM-A-	7	External Device Monitor Output Signal A	Output signal indicates that Safety Function A activates without failure.
EDM-A+	8		

Signal	Pin No.	Name	Function
–	1	–	–
–	2	–	–
/SRI-B1-	3	Safety Request Input Signal B1	Input signal for Safety Function B
/SRI-B1+	4		
/SRI-B2-	5	Safety Request Input Signal B2	
/SRI-B2+	6		
EDM-B-	7	External Device Monitor Output Signal B	Output signal indicates that Safety Function B activates without failure.
EDM-B+	8		

Cable with Connector for CN21 and CN22 (Model: JZSP-CVH03-03-E)



• Specifications Model JZSP-CVH03-03-E

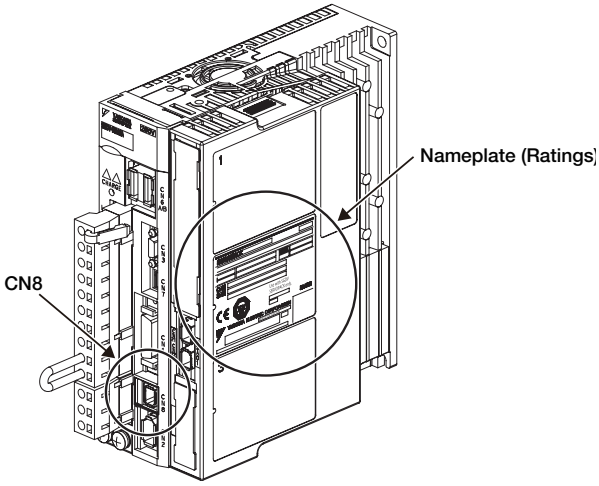
Pin No.	Signal	Lead Color	Marking Color
1	Not used	–	–
2	Not used	–	–
3	/HWBB1–	White	Black
4	/HWBB1+	White	Red
5	/HWBB2–	Gray	Black
6	/HWBB2+	Gray	Red
7	EDM1–	Orange	Black
8	EDM1+	Orange	Red

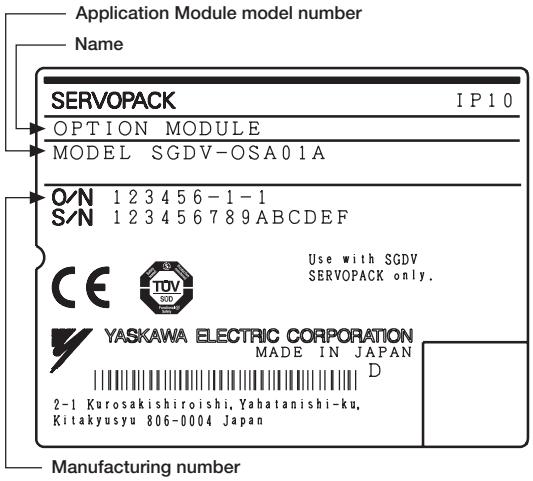
• Specifications Model JZSP-CVH03-03-E-G3

Pin No.	Signal	Lead Color	Marking Color
1	Not used	–	–
2	Not used	–	–
3	/HWBB1–	White	–
4	/HWBB1+	Brown	–
5	/HWBB2–	Green	–
6	/HWBB2+	Yellow	–
7	EDM1–	Grey	–
8	EDM1+	Pink	–

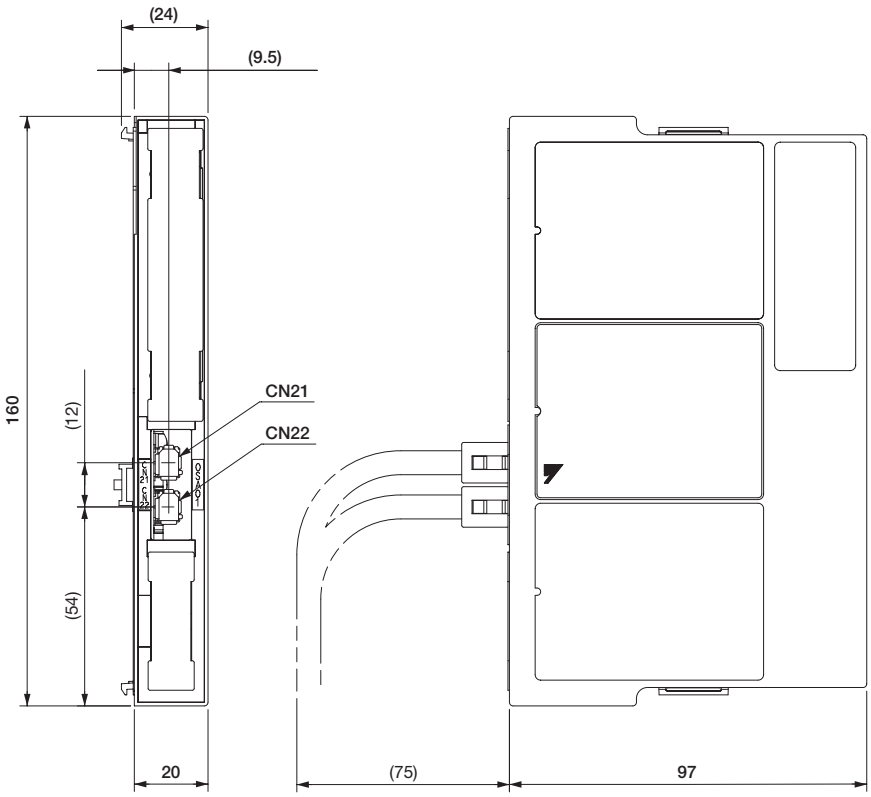
Nameplate and External Dimensions

- Nameplate (Ratings) and Model Designation





- External Dimensions Units: mm



Approx. Mass: 0.11 kg

Specifications of the Safety Module

- Specifications

Items		Specifications	
Applicable SERVOPACK	Σ-V Series	Rotational motor	SGDV-□□□□01 (analog pulse model) SGDV-□□□□11 (M-II model) SGDV-□□□□E1 (command option attachable type)
		Linear motor	SGDV-□□□□05 (analog pulse model) SGDV-□□□□15 (M-II model) SGDV-□□□□E5 (command option attachable type)
Placement		Attached to the SERVOPACK	
Power Specifications	Power Supply Method	Supplied from the control power supply of the SGDV SERVOPACK	
Operating Conditions	Ambient/Storage Temperature	Ambient temperature: 0 to +55°C, Storage temperature: –20 to +85°C	
	Ambient/Storage Humidity	90% RH or less (with no freezing or condensation)	
	Vibration/Shock Resistance	Vibration resistance: 4.9 m/s^2, Shock resistance: 19.6 m/s^2	
	Protection Class/Pollution Degree	Protection class: IP10, pollution degree: 2 An environment that satisfies the following conditions. • Free of corrosive or flammable gases • Free of exposure to water, oil or chemicals • Free of dust, salts or iron dust	
	Altitude	1000 m or less	
	Others	Do not use SERVOPACKs in the following locations: - Locations subject to static electricity noise, strong electromagnetic/magnetic fields, radioactivity	
Compliance with North American Safety Standards, European Directives, and Safety Standards (SERVOPACK + Safety Module)			
North American Safety Standards		UL508C	
European Directives	Machinery Directive (2006/42/EC)	EN ISO 13849-1: 2008 - EN 954-1	
	EMC Directive (2004/108/EC)	EN 55011/A2 2007 Group 1, Class A - EN 61000-6-2 - EN 61800-3	
	Low Voltage Directive (2006/95/EC)	EN 50178 - EN 61800-5-1	
Safety Standards	Safety of Machinery	EN ISO 13849-1 - EN 954-1 - IEC 60204-1	
	Functional Safety	IEC 61508-1 to -7 - IEC 62061 - IEC 61800-5-2	
	EMC Directive	IEC 61326-3-1	
Safety Function		IEC 61800-5-2	IEC 60204-1
		Safe Torque Off (STO)	Stop Category 0
		Safe Stop 1 (SS1)	Stop Category 1
		Safe Stop 2 (SS2)	Stop Category 2
		Safely Limited Speed (SLS)	
Safety Function Module		2 channels	
	Function A	Input signal: Two channels (redundant signals), output signal: one channel	
	Function B	Input signal: Two channels (redundant signals), output signal: one channel	
Safe Performance			
	Safety Integrity Level	IEC 61508, IEC 62061	SIL2, SILCL2
	Probability of Dangerous Failure per Hour	IEC 61508, IEC 62061	PFH ‹ 3.3x10-7 [1/h] (3.3% of SIL2)
	Category	IEC 954-1	Category 3
	Performance Level	EN ISO 13849-1	PLd (Category 2)
	Mean Time to Dangerous Failure of Each Channel	EN ISO 13849-1	MTTFd: High
	Average Diagnostic Coverage	EN ISO 13849-1	DCave: Medium
	Proof Test Interval	10 years	

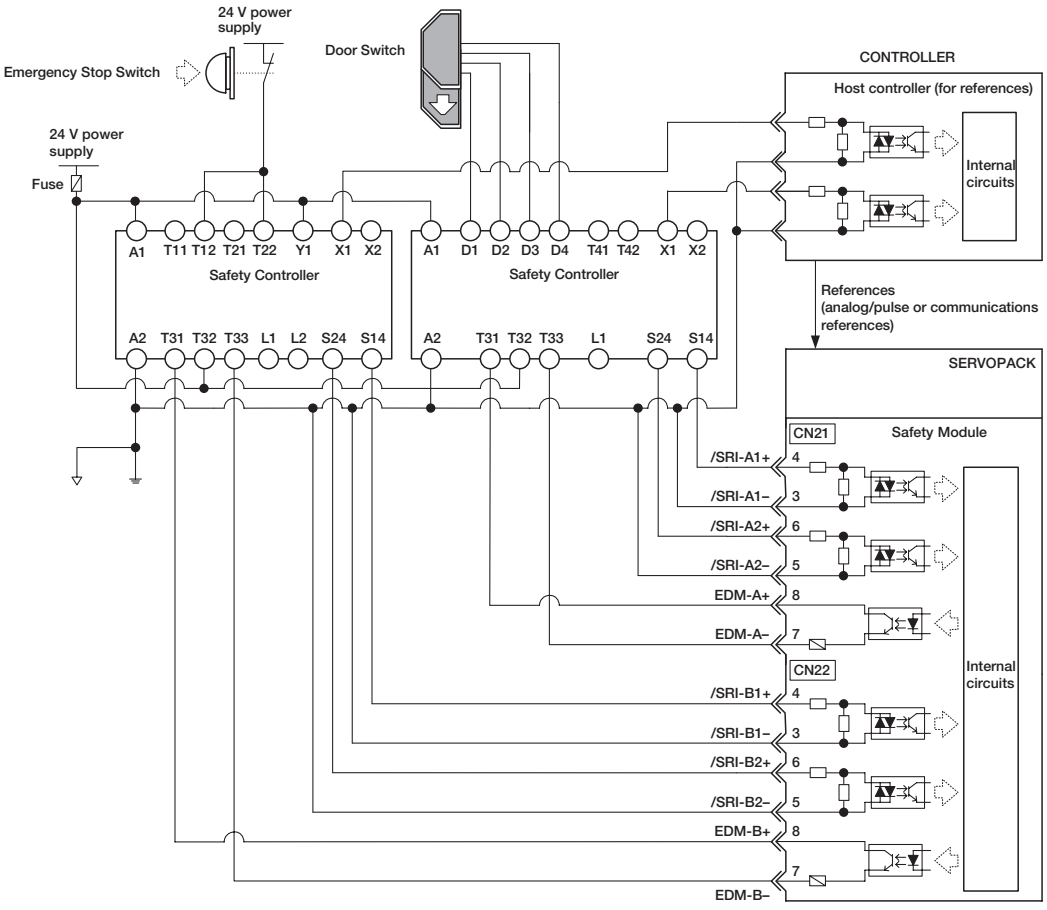
Specifications of the Safety Module

- Specifications (cont'd)

Items			Specifications	
Safety Functions	Number of Functions:		2	
	Safety Function A	Inputs	Number of Channels	2
			Function	Safety Request Input Signal (SRI-A1, SRI-A2)
		Output	Number of Channels	1
			Function	External Device Monitor Output Signal (EDM-A)
	Safety Function B	Inputs	Number of Channels	2
			Function	Safety Request Input Signal (SRI-B1, SRI-B2)
		Output	Number of Channels	1
			Function	External Device Monitor Output Signal (EDM-B)
Stopping Methods			Safety Functions (IEC61800-5-2)	Function names of Safety Module
			Safe Torque Off (STO)	Safe BaseBlock Function (SBB function)
			Safe Stop 1 (SS1)	Safe BaseBlock with Delay Function (SBB-D function)
			Safe Stop 2 (SS2)	Safe Position Monitor with Delay Function (SPM-D function)
			Safely-Limited Speed (SLS)	Safely Limited Speed with Delay Function (SLS-D function)
Others			Active Mode Function	
Response Time			Max. 200 ms	
Proof Test Interval			10 years	

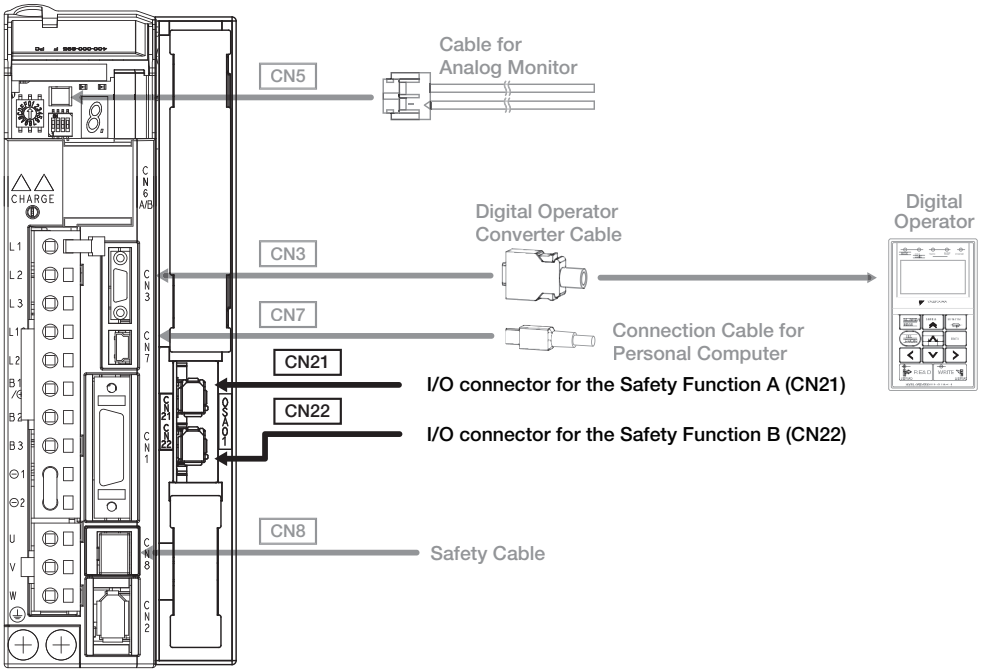
- System Configuration Example

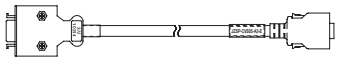
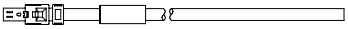
The safety functions are set to operate under the following conditions:
Safety Function A: Safety Function A (SLS-D function) operates when the door switch opens.
Safety Function B: Safety Function B (SBB-D function) operates when the emergency stop switch is pressed.



Selecting Cables

● Cables for CN1 CN3 CN5 CN7 CN8 CN21 CN22 for Sigma-5 SERVOPACKs



Name		Length	Order No.	Specifications
CN3	Digital Operator		JUSP-OP05A-1-E	With Connection Cable (1 m) 
	Digital Operator Converter Cable*1	0.3 m	JZSP-CVS05-A3-E	Cable with Connectors at Both Ends 
CN7 Connection Cables for Personal Computer		2.5 m	JZSP-CVS06-02-E	Cable with Connectors at Both Ends 
CN5 Cables for Analog Monitor		1 m	JZSP-CA01-E	SERVOPACK End 
CN21 CN22 Cables for Safety Function Device	Cables with Connector*2	3 m	JZSP-CVH03-03-E JZSP-CVH03-03-E-G3	
	Connector kit*3		Contact Tyco Electronics AMP K.K. Product name : Industrial Mini I/O D-shape Type1 Plug Connector Kit Model : 2013595-1	

*1 : A converter cable is required to use Σ-III series digital operators (model: JUSP-OP05A) for Σ-V series SERVOPACKs.
*2 : When using the safety function, connect this cable to the safety devices.
Even when not using the safety function, use SERVOPACKs with the Safe Jumper Connector (model: JZSP-CVH05-E) connected.
*3 : Use the connector kit when you make cables yourself.